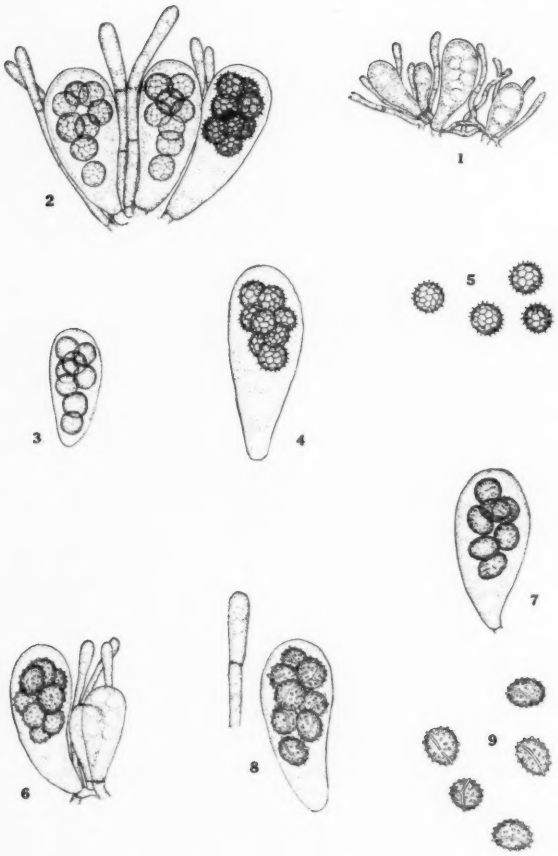


1–5. ASCODESMIS MICROSCOPICA (CROUAN) SEAVER
6–9. ASCODESMIS PORCINA SEAVER

MYCOLOGIA

VOL. VIII JANUARY, 1916 NO. 1

NORTH AMERICAN SPECIES OF ASCODESMIS

FRED J. SEAVER

(WITH PLATE 172, CONTAINING 9 FIGURES)

During the month of January, 1915, the writer secured an excellent growth of a species of *Ascodesmis* on the excrement of pigs sent from Porto Rico[1] by Mr. George L. Fawcett. The spores of this species were slightly ellipsoid and, when mature, were strongly roughened, although they were never found to be reticulate. At first it was thought that this species might be distinct from *Ascodesmis nigricans* in which species the spores are usually described as reticulate. Later, however, it was concluded that the apparent difference in spore characters was simply due to variation and the Porto Rican plants were finally referred to *Ascodesmis nigricans,* the only species known from North America.

In November, 1915, an abundant growth of *Ascodesmis nigricans* was obtained on the excrement of raccoon dog from the Bronx Zoological Garden. Careful study of this species from

[1] A collection of pig dung from New Jersey was placed in culture during the present season in order to determine whether the Porto Rican species was a geographical species or was governed by the substratum alone as is the case with so many of the coprophilous discomycetes. On December 11, 1915, since this paper was submitted, the species described here as new was found also on the New Jersey material. In all essential points the New Jersey specimens agree with the specimens grown on the same kind of material from Porto Rico and both differ from *Ascodesmis nigricans,* which we have still growing in the laboratory, as pointed out in the illustrations and descriptions accompanying this paper.

material derived from these cultures showed the spores to be globose and at maturity perfectly and distinctly reticulate, the ridges of the reticulations extending beyond the periphery of the spore as minute spines.

After a comparative study of the spores of the two specimens of *Ascodesmis*, the one grown on the excrement of pigs from Porto Rico and the other on the excrement of raccoon dog from the Zoological Garden, it was decided that they represented two distinct species.

So far as noted, the external characters of the two plants were identical. The apothecia appeared on a superficial mycelium and consisted of a tuft of asci without any well-developed excipulum. The form and size of the apothecia in the two species is almost identical. The spores of the Porto Rican species are slightly ellipsoid, although they would pass as subglobose. The chief difference is in the spore markings, those of the Porto Rican species consisting of tubercles or short interrupted ridges. In addition to this, these spores are often marked with an irregular ridge of meridial band which may be simple or occasionally branched. Since several hundred spores have been examined and these characters found to be constant and decidedly different from those of *Ascodesmis nigricans*, the Porto Rican specimens are regarded as new and described as *Ascodesmis porcina*. The differences in spore characters are shown in the accompanying plate. The following is a synopsis of the genus as at present known for North America.

ASCODESMIS Van Tiegh. Bull. Soc. Bot. Fr. **23**: 271. 1876

Apothecia minute, less than 1 mm. in diameter, very simple, consisting of a cluster of asci and paraphyses springing from a clump of basal mycelium; excipulum almost entirely undeveloped; asci comparatively few to each plant, very broad, 8-spored; spores globose or subglobose, hyaline, then pale-brown to blackish, becoming rough at maturity; paraphyses sparse.

Type species, *Ascodesmis nigricans* Van Tiegh.

Spores globose, reticulated.	*A. microscopica.*
Spores subglobose, rough but not reticulated.	*A. porcina.*

Ascodesmis microscopica (Crouan)

Ascobolus microscopicus Crouan, Ann. Sci. Nat. IV. **7**: 175. 1857.
?*Ascobolus caninus* Fuckel, Hedwigia **5**: 3. 1866.
Ascodesmis nigricans Van Tiegh. Bull. Soc. Bot. Fr. **23**: 275. 1876.
Boudiera microscopica Cooke, Grevillea **6**: 76. 1877.
?*Boudiera canina* Schröt. Krypt.-Fl. Schles. 3^2:55. 1893.
Boudiera Claussenii P. Henn. Hedwigia **42**: (182). 1903.
?*Ascodesmis reticulata* Bainier, Bull. Soc. Myc. Fr. **23**: 137. 1907.

Apothecia minute, less than 1 mm. in diameter, scattered or thickly gregarious, superficial, consisting of a tuft of asci and very stout paraphyses, at first entirely white, becoming dotted over with black specks, the ends of the asci filled with colored spores, finally becoming entirely black; excipulum almost wanting or consisting of loose mycelium similar to the paraphyses; asci broad-clavate to ovoid, reaching a length of 80 μ and a diameter of 30 μ, 8-spored; spores 2-seriate or irregularly crowded together, perfectly globose, becoming pale-brown and reticulated, reaching a diameter of 10–12 μ; reticulations net-like, the meshes reaching a diameter of 3 μ, the ridges of the reticulations thin and projecting about the periphery of the spore as minute spines; paraphyses hyaline, stout, scarcely enlarged above, reaching a diameter of 5–6 μ.

On excrement of dogs and tigers, less frequently on the excrement of other animals.

TYPE LOCALITY: Europe.

DISTRIBUTION: New York; also in Europe.

ILLUSTRATIONS: Ann. Sci. Nat. IV. **7**: *pl. 4, f. 20–23;* Zukal, Mycol. Unters. *pl. 2, f. 5–10;* Hedwigia **42**: (182), *f. 1–3.*

Ascodesmis porcina Seaver, sp. nov.

Apothecia very small, scarcely visible, scattered or thickly gregarious, at first subglobose, expanding and becoming subdiscoid, externally whitish or pallid, not exceeding 0.5 mm. in diameter; hymenium strongly convex, becoming dark, finally almost black by reason of the dark colored spores; excipulum almost wanting; asci broad clavate to ovoid, abruptly narrowed into a short stem-like base, reaching a length of 75–90 μ and a diameter of 25–35 μ; spores 2-seriate or very irregularly bunched near the end of the ascus, subglobose, at first hyaline and smooth, becoming pale-

brown and rough, reaching a diameter of 10–13 μ, or occasionally 10–11 $\times$ 12–13 μ; spore-roughenings very variable, consisting of minute rounded wart-like projections, short interrupted ridges, or often with one conspicuous simple or branched ridge extending across the visible surface of the spore; paraphyses stout, gradually enlarged at their apices, reaching a diameter of about 5 μ.

On excrement of pigs.

TYPE LOCALITY: Grown in the laboratories of the New York Botanical Garden on pig dung sent from Porto Rico.

DISTRIBUTION: Cultivated on pig dung from Porto Rico and New Jersey.

NEW YORK BOTANICAL GARDEN.

EXPLANATION OF PLATE CLXXII

Figs. 1–5. *Ascodesmis microscopica* (Crouan) Seaver.
Fig. 1. Young asci and paraphyses.
Fig. 2. Asci and paraphyses showing different stages in their development.
Fig. 3. Ascus with young spores.
Fig. 4. Ascus with mature spores.
Fig. 5. Mature spores isolated.
Figs. 6–9. *Ascodesmis porcina* Seaver.
Fig. 6. Young and mature asci.
Fig. 7. Ascus with spores partially matured.
Fig. 8. Ascus and paraphysis with mature spores.
Fig. 9. Mature spores isolated.

FUNGI PRODUCING HEART-ROT OF APPLE TREES

B. O. Dodge

(With Plates 173–176, Containing 10 Figures)

Any one familiar with the old apple orchards of the East is aware that there must be specific causes connected with the rotting of the trunks of the trees. When trees that ought to be in the prime of life are found with huge knot-holes leading into great hollows in the trunk, the pathologist feels perfectly certain that some fungus has gained entrance to the wound caused by the removal of a limb at this point.

At Camp Columbia, near Litchfield, Conn., and on the farms in the vicinity, there are many old orchards that are especially favorable for a study of diseases peculiar to the apple tree. Nature is left to take its course in the abandoned orchard, with the result that fungi directly or indirectly the cause of wood-rot are given an opportunity to develop their fruiting bodies, without which the identification of the disease is still more uncertain. Some of these trees seventy-five or one hundred years old are still bearing apples, although the trunk is a mere shell of sap-wood, frequently only a part of the shell remaining. A large percentage of the trees bear evidence of the presence of fungi commonly known as heart-rots.

I have made an effort to collect various types of fungi growing on living trees with the hope that something further might be contributed toward the discovery of the particular fungi causing these destructive heart-rots. I was greatly assisted in this work of collecting and photographing the specimens by Mr. Paddock, a student in botany at the camp.

The well-known rots of hickory, oak, maple, elm, etc., were fairly common there. A number of bracket and encrusting forms (*Polyporus versicolor, Schizophyllum commune, Irpex lacteus,* etc.) were found on dead limbs and trunks of the apple, but as

these grow everywhere on all sorts of timber their presence on apple is not particularly significant as causing the diseases of the living trees. A perennial form resembling the fire punk (*Fomes igniarius*) occurs on a few apple trees just below the camp. On one of the trees the fungus has developed the fruit bodies on the cut ends of stubs of limbs, showing probably where the fungus gained entrance in years past through faulty pruning.

But all these are doubtless comparatively secondary in causing the very destructive heart-rots found in these old orchards. A number of very conspicuous and striking forms which I have found are beyond doubt the main causes which limit the life of the orchard tree. This is not saying that these fungi are directly parasitic, but by eating out the heart-wood of the tree they lead to the breaking off of the larger branches and finally to the destruction of the trunk.

During the early part of August, Mr. Moldenke first called my attention to a cluster of "mushrooms" growing on the side of a living apple tree in an orchard through which the Columbia student surveyors were "running a railroad." The fungus had grown out from a small spot in the sap-wood and the line of decay was found to lead into the heart-wood, which was very badly rotted. Figure 2 on plate 173 shows such a punk as it grows on the living tree. Professor Finch a few days later located a similar fungus on a comparatively young apple tree near the cottage at South View Inn. This one grew out from a crack caused by the splitting of the trunk where a limb had been torn out (*Pl. 173, f. 3*). It was a beautiful milk-white cluster, so fragile that the slightest pull was sufficient to break off a piece. An old punk just below this cluster, evidently a growth of the preceding year, showed how discolored, hard, and leathery the fungus may become as it dries out. Two very beautiful specimens (*Pl. 173, f. 2*, and *Pl. 174, f. 2*) were found on a tree in Mr. Weik's orchard. Several others were brought in during the middle of August from orchards in the vicinity. The specimens, while varying greatly in form and size, appear to belong to the same species. It is a form that first attracted the attention of Dr. Burt at Riverside, Maine, in 1898. He sent it to Professor Peck, New York State

botanist, who recognized that it was a new species and described it in the *Bulletin of the Torrey Botanical Club,* Vol. 26, 1899, under the very appropriate name, *Polyporus admirabilis,* "the wonderful polypore." He added Dr. Burt's remarks: "The fresh tufts of clear white trumpet-shaped pilei are suggestive of clusters of giant calla lillies." Peck originally described the fungus rather inadequately because of the lack of a large number of specimens at the time. He says: "Pilei tufted, large, more or less imbricated, nearly entire, centrally depressed or subinfundibuliform." This would not cover the solitary, flattish, nearly lateral forms. Such forms are shown in *Pl. 173, f. 1.* Professor Underwood also found one of these flat forms on an apple tree at Redding, Conn., in August, 1906, and another less distinctive with much thicker flesh in 1907. These two specimens are in the herbarium of the New York Botanical Garden.

Forms frequently occur that appear from a distance to be made up of several individuals crowded together forming a "cluster." Such specimens are shown in *Pl. 173, f. 1,* on the trunk, and *Pl. 174, f. 2.* These are simply one fungus body so lobed and folded as to resemble a tuft or cluster composed of several individuals growing close together. Figure 2, on plate 174, looks like three punks (pilei), although it is only a peculiarly folded single specimen. There are, however, such clusters as Peck described made up of individuals somewhat imbricated or fused together.

Another specimen of this species mentioned by Peck (Annual Report 54, p. 154, 1901) came from Lake George. Of this one he says: "The specimen here recorded is less regular and deeply depressed in the center than a typical form which was found growing at the base of an apple tree in Maine." In the original description the surface is described as "glabrous, white or slightly tinted with pale yellow or cream color; pores minute, rotund, whitish; pilei 10–15 cm. broad, united at the base, forming tufts 30 cm. or more in diameter."

The forms that I have found at Camp Columbia are beautiful, large, vigorously growing punks, easily recognizable and conspicuous objects. One of their most characteristic features as compared with the forms of another type to be mentioned later,

is the peculiar, smooth, "glacé kid glove" feeling of the surface. They justify Professor Peck's characterization "*admirabilis*" in every respect.

With the aid of Dr. House, the state botanist, I was enabled to examine all of Peck's specimens of this fungus in the herbarium at Albany. One specimen collected by S. H. Burnham on an apple tree trunk at Pike Pond, New York, July, 1910, has a margin that is beautifully and evenly scalloped. The surface is even, light-straw-colored, and has characteristically a "kid glove feeling." There are one or two faint zones near the margin formed by depression but there are no color differences. There is a slight tendency to splitting up or pileolation, there being one accessory pileus. The stem is much reduced or even lacking. There is another specimen from Crown Point, N. Y., collected by Dr. Peck, which is a cluster of three plants now in very poor condition. No host is given but it is evidently the same species.

I have found *Polyporus admirabilis* only on apple trees, but it is to be noted that there are two specimens in the State Herbarium under this name that are of special interest, since they were collected on other hosts than the apple tree. The one on ash found by S. H. Burnham at Vaughans, N. Y., July 6, 1907, and mentioned in the report for 1907, p. 12, is a dead-white form with minute pores. Two plants are joined together at their margins. The stems are quite distinct and prominent. The other specimen was collected by Mr. Burnham at the same place August 25, 1911, on a "living fallen butternut." The stem is central or slightly eccentric and more pronounced. All of these specimens are pure-white with no trace of straw-color, otherwise they resemble those growing on ash. These forms on the ash and butternut appear to be somewhat different from those on the apple tree and are certainly more like specimens of *P. Underwoodii* in Murrill's collections at the New York Botanical Garden, but whether these differences would hold in a larger range of specimens and whether the spores of these forms would grow on the apple tree, are questions of considerable interest and must be further studied. Another specimen in the Albany Herbarium, which plainly should be called *P. admirabilis*, bears the name *Polyporus Underwoodii*.

This was collected by Mr. Burnham at Pike Pond, July 23, 1910, on a fallen apple tree trunk. Just why this was called *Polyporus Underwoodii* and the one on the ash collected by the same person at the same place should be called *Polyporus admirabilis* is not clear. This specimen corresponds very well with the text description of *P. admirabilis* and to many of the forms collected at Camp Columbia. It shows distinctly the tendency both to bracketing and clustering. The margin is finely and irregularly scalloped. It has the "glacé kid finish" but is further markedly ribbed and streaked with faint zonations in form and color. The depressed, funnel-shaped disk is somewhat flesh-colored. The stems are quite conspicuous, though short, but the pores extend down to the base on the under surface.

In connection with the question as to the group relationship of these forms, a specimen of *"Polyporus Underwoodii"* from the Albany collection is of considerable interest. Lloyd has evidently noted the obvious resemblance of these apple tree forms to the *Melanopus,* black stemmed, group of polypores in stating that Peck's *P. admirabilis* is a variety of *P. varius,* or belongs to that group, though he does not state that any of his specimens of the apple tree fungus show a blackening of the stem. This specimen of *P. Underwoodii* found on a willow stump to which I refer was collected by H. J. Banker at Schagticoke, N. Y., August 27, 1908. It has the general form and size of *P. admirabilis* with the irregularly scalloped margin and depressed center. The specimen is somewhat weathered and the surface is roughened and blackish-spotted. The pore characters are not different. It has a conspicuous, sterile, blackened, eccentric stem and, like a smaller specimen of the same collection, bears some resemblance to a much exaggerated and unusually thin form (for its size) of *P. varius.*

Another specimen collected by Dr. Banker August 2, 1904, and referred to by Peck in describing *P. Underwoodii* is still closer to *P. admirabilis* in appearance, but it has the black, though very short stipe. One specimen from this collection given to the New York Botanical Garden has a central stipe but otherwise resembles the 1908 specimen from the same regions. Further collections of

this type of fungus with the black stem but otherwise resembling *P. admirabilis* may clear up the relation between the apple tree form and those of the *Melanopus* group, and all these relationships must be cleared up if the question of protecting the apple tree against heart-rot is to be attacked with any degree of success.

In every case where such a punk was discovered on the apple, it was found that the heart-wood was in a bad state of decay, although in some cases one would say, judging from external appearances, that the tree was perfectly sound. The pores in all of these species are very small and those of *P. admirabilis* are extremely minute. The tubes are 1–2 mm. long and the flesh varies in thickness 1–2 cm. at most toward the point of attachment. As I have noted, some of the specimens show lines or streaks extending from the margin to the central depressed region (*Pl. 174, f. 2*). The single fruit-body shown at the base of the tree in *Pl. 173, f. 1,* measured eighteen inches along its greatest diameter and weighed four and one half pounds. This is probably the largest specimen of the species yet recorded and it has been placed in the Herbarium of the New York Botanical Garden. Dr. Murrill has confirmed the identification of the species.

So far as I find, there is little in the literature relating to fungi that cause heart-rots of apple tree. Morse and Lewis of the Maine Agricultural Station describe several diseases affecting the leaves and fruit of apples and discuss briefly the wood-rots of the apple tree, but they do not ascribe the rots to any particular fungi. Craig has made extensive surveys of the apple orchards of New York and has discussed the subject of pruning as connected with the decay of trees. He does not mention having seen this fungus or any other of its kind on the living trees. The punks of this polypore are evidently either rare or have been overlooked, since there are only the half dozen specimens described above in the herbarium at Albany and two at the New York Botanical Garden. It will be interesting to learn whether a long rainy season, such as we had in July and August, 1915, is one of the conditions necessary for the production of the punks.

We found another type of fungus growing from a decayed root stub in Mr. Bennett's grove near Camp Columbia. It is a white

polypore (*Pl. 174, f. 1*) three or four inches in diameter, depressed or funnel-shaped and somewhat inequilateral. The surface is radially split or cracked and somewhat lobed, and is also broken up into concentrically arranged scale-like tufts. The tubes are large and angular, running down on the stem, which is very well marked. This plant is tough from the first, about the consistency of the railroad tie fungus (*Lentinus lepideus*). It was kept under observation for about three weeks. At the time the photograph shown in *Pl. 174, f. 1,* was taken, Mr. Paddock called my attention to the spores that were being shed in little white clouds. It is possible that this is a form of *Polyporus admirabilis* that grows saprophytically on wood other than that of the apple tree. The character of the surface, the large size of the angular pores, and its place of growth, suggest more strongly, however, that it is quite another species. Dr. Murrill, who has examined this specimen, informs me that it is near *P. Underwoodii,* although it does not have a black stem as do both the specimens at Albany and as required by the description.

The apple grower is much more interested in the extent of damage that is being wrought than in controversies over the identity of the fungus causing the disease. He wants to know how to recognize the fungus, how to cure the diseased tree, and how to prevent further infection. While it is the part of wisdom to follow the most approved methods of pruning, it may be well to consider whether the ordinary precautions that are taken to coat the cut surface with paint is really of much avail in keeping out the spores of these fungi. Freezing and thawing, wetting and drying certainly will cause cracks to open up and, unless the surface is kept well painted until a callus completely covers the wound, there can be no certainty that some fungus will not gain entrance. The fungus here under consideration causing the heart-rot of apple trees could, perhaps, be more easily controlled by the destruction of the spore-producing bodies themselves, since they are large and conspicuous and easily removable.

OTHER TYPES OF PUNKS CAUSING HEART-ROT OF APPLE TREES

As I have noted previously, *P. admirabilis* belongs to the group in which the fruit-body has a stem, although it may be very much

reduced. There is a series of other forms that were even more common on apple trees during the past season, which are brackets in form and are often placed one above the other and closely connected. A beautiful example of this type (*Pl. 175, f. 2*) was found August 10 on a tree in the orchard near Robert Hill's residence, a few miles from Camp Columbia. In color, size of pores, zonation and consistency of flesh, I was unable to distinguish between it and such a form of *P. admirabilis* as is shown in *pl. 173, f. 3*. The fact that the former is a shelving or bracketed punk, however, suggests that it must be an entirely different species. Further search has shown that many apple trees were infected this year with a form resembling this one. It is impossible to say what conclusion will be reached as to the number of species involved until a more extensive study of these apple tree fungi has been made. I have found similar punks in many old orchards in New York, New Jersey, and in several localities in Connecticut, and have a form collected by Professor Harper on a living apple tree at Bedford City, Va., September 16. These forms are much more abundant at Camp Columbia than *P. admirabilis*. Most commonly the base of the tree would be quite covered on one side with such punks as are shown in *Pl. 175, f. 1*. The heartwood as the result of the attack is usually very spongy or entirely decayed. The fungi are so fragile that it is difficult to cut out the bark and sap-wood bearing them without shattering the punks. The upper surface in this particular type is soft and spongy, at first somewhat "foamy" in appearance. They are sometimes quite thin at the edge, thickening further back or even becoming hoof-shaped (*Pl. 175, f. 1*). The only difference between this form and the one found at Robert Hill's appears to be the character of the upper surface and the texture of the flesh. The pores are somewhat larger and the flesh thicker in the former. Both forms were observed for several days as they were growing and these differences were quite noticeable from the first.

A somewhat different type was found by Mr. R. R. Stewart at New Rochelle, N. Y., September 21, and its pore surface is shown in *Pl. 175, f. 3*. This single specimen was growing on a living apple tree about five or six feet from the ground. It is a thin,

flat form about four inches wide by six inches long, and not over half an inch thick. The tubes are about one fourth of an inch long, the flesh is zonate and about as thick as the tubes are long. The fungus was white when fresh but it turned yellowish or straw-colored on drying. We have further specimens of this type of fungus, many of them growing on the inside of the hollow trunks of the apple tree. Mr. Burgdorff called my attention to one of this kind at Scarsdale, November 17. About five feet above the ground there was a large knot-hole leading into the hollow trunk of an apple tree about seventy-five years old. Several overlapping, much divided brackets had developed inside the trunk on the decayed heartwood about a foot above the opening formed by the knot-hole. This led me to examine more closely hollow trees in different localities and, in one orchard at Spring Valley, N. Y., on November 26, we found six different trees that had the same type of fungus entirely concealed within. In all cases the color was masked by the pulverized wood, the tubes and flesh were dingy or brownish. The upper surface especially was a reddish-brown. The ones found at Spring Valley were hard and dry and had evidently reached maturity several weeks previously. On December 7, Mr. Burgdorff brought in another specimen of this same general type, although there are in this one certain peculiarities that may serve to connect up many of the forms that are found on the apple tree. It was late in the season, the fungus was in fairly good condition, and spores could be found in abundance. It was about five inches long and six inches wide, consisting of several shelving brackets grown together behind, and the flesh was beautifully zonate and at least an inch thick, thinning out toward the margin. The tubes were about one fourth of an inch in length.

Professor Harper, as noted above, found quite another type growing on an apple tree at Bedford City, Va., September 16. This form, shown on *Pl. 176*, resembles the one shown on *Pl. 175* with respect to surface markings, etc., but it is a solitary form, more hoof-shaped, and has flesh that is several inches thick and strikingly zonate. The tubes are half an inch long and very much larger than those of any other specimens previously men-

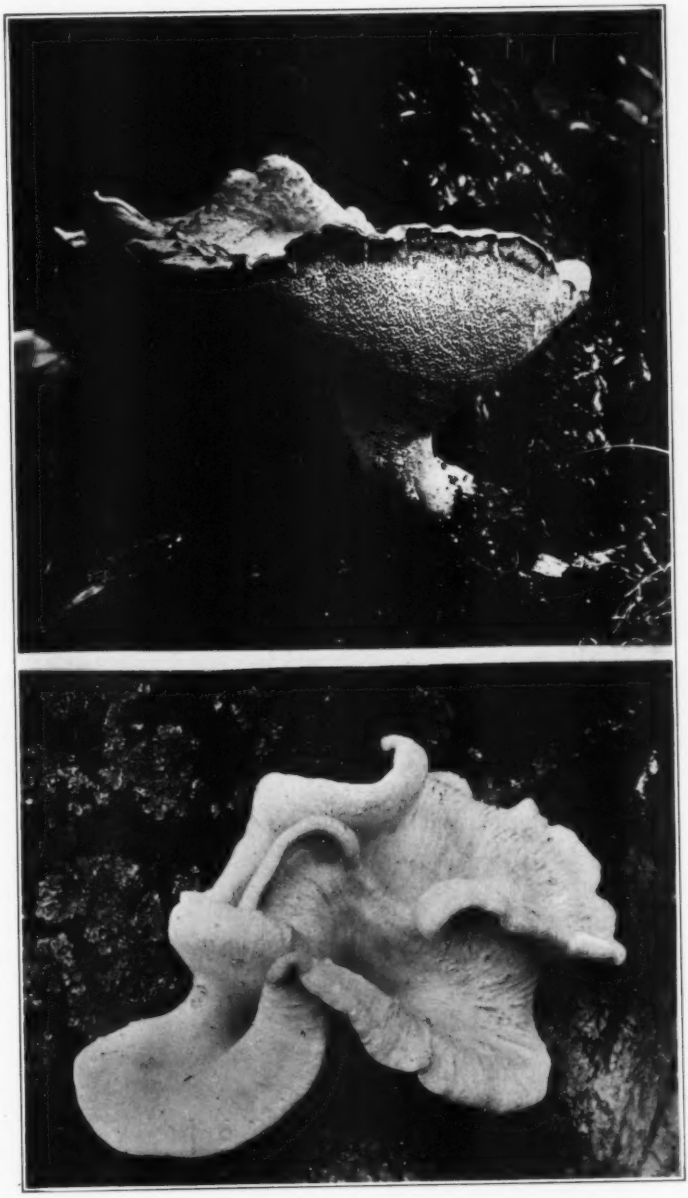
tioned. It is a heavy, soggy fungus, drying hard and horny. Dr. Murrill identifies this form as *Spongipellis fissilis*.

We have thus several types of the second form of fungus causing a heart-rot of the apple trees. Just what is their identity cannot be determined with certainty at present. Dr. Murrill, who has seen some of our specimens from the vicinity of New York City, identifies them as *Spongipellis galactinus*. There is a specimen at the New York Botanical Garden bearing this name collected by F. C. Stewart from a living apple tree. His field notes state: "Pure white, inside a hollow apple tree, Redding, Conn., 1907." Murrill mentions this peculiarity in a note (Bull. Torrey Club **32**: 476, 1905). He says: "One of its favorite hosts is the apple tree, on which it has several times been found in New York and Connecticut, growing inside partially decayed trunks or emerging from knot-holes in living trees. When fresh, it is pure-white or watery-white and so full of water that this may be squeezed out as from a sponge."

This is a very interesting series of forms connected with the destruction of orchards of the region. None of them has been hitherto regarded as particularly damaging to the apple tree, but there can be no question, in my opinion, that they are quite limited to the apple tree. Mr. Lloyd reports twenty collections of this second series of types, most of them from apple trees of the New England States. A few are from chestnut. He calls them *Polyporus spumeus* var. *malicolus*. Lloyd evidently recognized this form as particularly limited to the apple and mentions that they are the cause of heart-rot of apple trees of New England. Whether his identification of these forms is correct, is a question that can be determined only by further study of the group, which should, of course, include inoculation experiments.

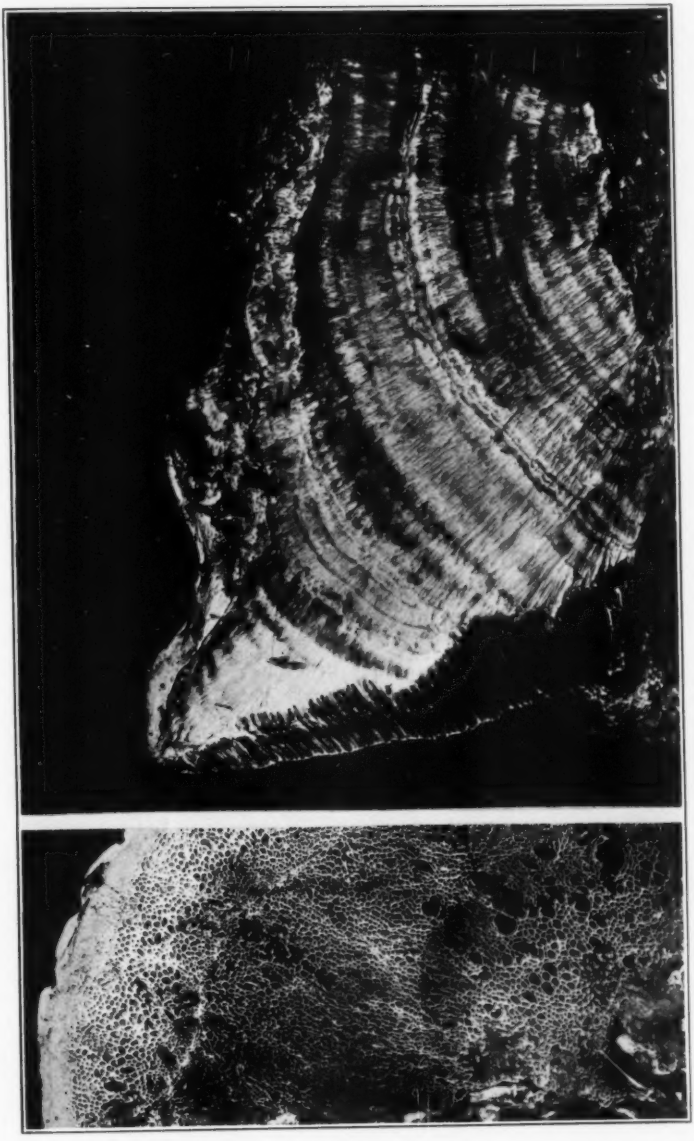
COLUMBIA UNIVERSITY,
NEW YORK CITY.

FOLYPORUS ADMIRABILIS PECK



1. POLYPORUS sp.
2. POLYPORUS ADMIRABILIS PECK

SPONGIPELLIS GALACTINUS (BERK.) PAT.



SPONGIPELLIS FISSILIS (BERK & CURT.) MURRILL

EXPLANATION OF PLATES CLXXIII–CLXXVI

All the specimens mentioned here were collected on living apple trees, with the exception of that shown on *Pl. 174, f. 1.*

PLATE CLXXIII

Fig. 1. An old apple tree that had been struck by lightning some time in the past. Three punks matured August 15, 1915. The one below on the trunk was eighteen inches across. These are good specimens of *Polyporus admirabilis.*

Fig. 2. Shows a cluster of the punks apparently growing from a healthy limb. In reality the heart-wood was decayed. Specimens now in the herbarium of the New York Botanical Garden.

Fig. 3. *Polyporus admirabilis* on a young apple tree at South View Inn.

PLATE CLXXIV

Fig. 1. A specimen of *Polyporus* near *P. Underwoodii* found on a decayed root stub in Bennett's grove.

Fig. 2. *Polyporus admirabilis* from Mr. Weik's orchard. A much folded specimen resembling a cluster of three individuals.

PLATE CLXXV

Fig. 1. These specimens have been identified by Dr. Murrill as *Spongipellis galactinus.* Would be called *Polyporus spumeus* var. *malicolus* by Mr. Lloyd.

Fig. 2. The specimen from Robert Hill's orchard near Camp Columbia has many of the characters of *P. admirabilis,* yet is plainly one of the bracket forms like those shown in Fig. 1.

Fig. 3. Pore surface from a specimen found by Mr. Stewart at New Rochelle, September 21, 1915.

PLATE CLXXVI

A form found by Professor Harper on living apple tree at Bedford City, Virginia, September 16, 1915, identified by Dr. Murrill as *Spongipellis fissilis.*

Fig. 1. Shows the thick flesh, which is beautifully zonate, the long tubes, and rough surface.

Fig. 2. View of the pore surface.

UREDINALES OF PORTO RICO BASED ON COLLECTIONS BY F. L. STEVENS[1]

J. C. Arthur

Species Reported from Porto Rico Not Represented Above

110. Ravenelia portoricensis Arth., on *Cassia emarginata* L. (*Caesalpiniaceae*), Ponce, Dec. 3, 1902, A. A. Heller *6193*. Also in Jamaica on *Cassia* sp.

111. Hemileia vastatrix B. & Br. on *Coffea arabica* L. (*Rubiaceae*), said to have once been found, and subsequently exterminated.

112. Tranzschelia punctata (Pers.) Arth. (*Puccinia Prunispinosae* Pers.), on *Amygdalus persica* L. (*Amygdalaceae*), Mayagüez, May, 1903, F. S. Earle *83*. Also in Bermuda on same host.

113. Uromyces Cologaniae Arth., II, on *Teramnus uncinatus* Sw. (*Fabaceae*), Cayey, mountai nside north of city, January, 1911, E. W. D. Holway.

114. Uromyces Howei Peck, on *Asclepias curassavica* L. (*Asclepiadaceae*), Comercio, February, 1911, E. W. D. Holway.

115. Uromyces Pavoniae Arth., on *Pavonia racemosa* L. (*Malvaceae*), Mayagüez and Joyua, June–July, 1901, L. M. Underwood *193*.

116. Puccinia purpurea Cooke, on *Holcus Sorghum* L. (*Sorghum vulgare* Pers.) (*Poaceae*), La Carmelita, April, 1904, G. P. Clinton; Rio Piedras, May, 1912, Cowgill & Johnston *505*. Also on same host in Cuba; on *Holcus halepensis* L. (*Sorghum halepense* L.) in Cuba and Jamaica; and on *Sorghum officinarum* L. in Bermuda.

117. Puccinia Scirpi DC. (*Aecidium Nymphoidis* DC.), on *Scirpus lacustris* L. (*Cyperaceae*), in a meadow near Guanica, Dec. 15, 1902, A. A. Heller *6291*. The aecia

[1] Continued from Mycologia 7: 332. 1915.

were collected by Charles Wright on *Limnanthemum Grayanum* Griseb. (*Menyanthaceae*), in Pinar del Rio, Cuba, December, 1857 or 1858. No other West Indian stations are known.

118. **Puccinia Cordiae** sp. nov.

Uredinia hypophyllous, scattered, sometimes in coalescent groups of a few sori each, round, 0.2–0.4 mm. across, dark cinnamon-brown; paraphyses peripheral, hyphoid, 10–18 by 45–75 μ, the wall thin, 1 μ, colorless; urediniospores broadly ellipsoid or globoid, 21–25 by 28–35 μ; wall golden-brown, 1.5–2 μ thick, usually thicker above, 5–12 μ, often somewhat thickened at hilum, closely verrucose, the pores indistinct, probably 3 or 4, equatorial.

Telia resembling uredinia but darker color, chestnut-brown; teliospores ellipsoid, 19–26 by 37–55 μ, rounded at both ends, not constricted at septum; wall dark chestnut-brown, uniformly thick, 2.5–3 μ, or slightly thicker above, very coarsely and sparsely verrucose, especially above; pedicel colorless, 6–9 by 30–40 μ, hygroscopic near base, swelling in water to 20 μ in diameter.

ON EHRETIACEAE:

Cordia alliodora (R. & Pav.) Cham., Ponce, January, 1911, E. W. D. Holway.

A rust on *Cordia* sp. from Peru has been described by Hennings under the name *Uredo Cordiae* (Hedwigia **43**: 163. 1904). The morphological characters are similar, but in habit it is said to produce gall-like swellings in the leaves and shoots resulting in witches-brooms, while the material from Porto Rico shows nothing of this sort.

119. PUCCINIA XANTHII Schw. on XANTHIUM LONGIROSTRE Wallr. (*Ambrosiaceae*), San Juan, February, 1914, Britton and Cowell *1485;* Santurce, February, 1914, J. R. Johnston *1338*. Also in Cuba and St. Domingo on same host.

120. UREDO SUPERIOR Arth. on *Fimbristylis spadicea* (L.) Vahl (*Cyperaceae*), low ground along the coast, eight miles west of Ponce, Dec. 12, 1902, A. A. Heller *6279*. Also reported by Mayor (l. c., p. 581) from Haiti on same host.

121. UREDO ARTOCARPI B. & Br. (*Physopella* (?) *Artocarpi* Arth.) on *Artocarpus communis* Forst. (*Artocarpaceae*), Mayagüez, April, 1904, G. P. Clinton *162*. Only American station known.

122. UREDO GYNANDREARUM Corda, on *Habenaria maculosa* L. (*Orchidaceae*), Cataño, January, 1911, C. F. Millspaugh *257*. Also on same host, El Yunque, Cuba, December, 1910, J. A. Shafer *7992*. Both specimens were found in the phanerogamic collection at the New York Botanical Garden.

SPECIES REPORTED FROM THE WEST INDIES BUT NOT KNOWN FROM PORTO RICO

123. COLEOSPORIUM EUPATORII Arth., on *Eupatorium macrophyllum* L. (*Carduaceae*), Cuba.

124. ALVEOLARIA CORDIAE Lagerh., on *Cordia cylindrostachya* R. & S. (*Ehretiaceae*), Jamaica.

125. RAVENELIA HUMPHREYANA P. Henn., on *Poinciana pulcherrima* L. (*Caesalpiniaceae*), Cuba, Jamaica.

126. RAVENELIA PAPILLIFERA Sydow, on *Cassia angustisiliqua* Lam. (*Caesalpiniaceae*), Bahamas.

127. CALLIOSPORA FARLOWII Arth., on *Parosela domingensis* (DC.) Heller (*Fabaceae*), Cuba.

128. PROSPODIUM BAHAMENSE Arth., on *Tecoma Leucoxylon* (L.) Mart. (*Bignoniaceae*), Bahamas.

129. PROSPODIUM PLAGIOPUS (Mont.) Arth. (*Puccinia plagiopus* Mont.) on *Tecoma lepidota* (H. B. K.) DC. (*Bignoniaceae*), Cuba.

130. NEPHLYCTIS TRANSFORMANS (Ellis & Ev.) Arth. (*Puccinia transformans* Ellis & Ev., *P. exitiosa* Syd. & Holw.), on *Stenolobium Stans* (L.) D. Don (*Tecoma Stans* Juss.) (*Bignoniaceae*), Bahamas, Cuba.

131. GYMNOSPORANGIUM BERMUDIANUM (Farl.) Earle, on *Juniperus bermudiana* L. (*Juniperaceae*), Bermuda, on *J. lucayana* Britt., Bahamas.

132. ERIOSPORANGIUM EVADENS (Harkn.) Arth., on *Baccharis* sp. (*Carduaceae*), Cuba.

133. UROMYCES MEDICAGINIS Pass. (*Nigredo Medicaginis* Arth.) on *Medicago denticulata* Willd. (*Fabaceae*), Bermuda.

134. UROMYCES TRIFOLII (Hedw. f.) Lév. (*Nigredo Trifolii* Arth.) on *Trifolium repens* L. (*Fabaceae*), Jamaica.

135. PUCCINIA CLADII Ellis & Tracy, on *Mariscus jamaicense* (Crantz) Britt. (*Cladium effusum* Torr.) (*Cyperaceae*), Bermuda.

136. PUCCINIA OXALIDIS (Lév.) Diet. & Ellis (*Argomyces* (?) *Oxalidis* Arth.), on *Ionoxalis Martiana* (Zucc.) Small (*Oxalidaceae*), Jamaica.

137. PUCCINIA OPULENTA Speg., on *Exogonium arenarium* (Steud.) Choisy (*Ipomoea arenaria* Steud., *I. Steudeli* Millsp.) (*Convolvulcaeae*), St. Thomas, March, 1913, J. N. Rose.

138. PUCCINIA SPILANTHIS P. Henn., on *Spilanthes oleracea* Jacq. (*Carduaceae*), Martinique.

139. PUCCINIA SPEGAZZINII DeT., on *Mikania scandens* (L.) Willd. (*Carduaceae*), Martinique, Aug. 4, 1913, F. L. Stevens *2971*.

140. UREDO ANTHEPHORAE Sydow, on *Anthephora hermaphrodita* (L.) Kuntze (*A. elegans* R. & S.) (*Poaceae*), Cuba.

141. UREDO HELICONIAE Diet., on *Bihai psittacorum* (L. f.) Kuntze (*Heliconia psittacorum* L. f.) (*Scitamineae*), Martinique, Aug. 4, 1913, F. L. Stevens *2967*.

142. UREDO WILSONI Arth., on *Anastrophia bahamensis* Urban (*Podostemaceae*), Bahamas.

APPENDIX

Since the study was completed of Professor Stevens' Porto Rican collections of 1912–14, and a large part of the article in type, additional collections made by Professor Stevens during June, July and August, 1915, have come to hand. In this supplementary lot of Porto Rican material there are some 254 numbers, representing about 78 species. A part of the new material, as would be expected, duplicates that previously secured, but in many instances it was obtained in new localities. In some cases a species was found not previously known from Porto Rico, or on an unrecorded Porto Rican host. The new material has, furthermore, proved surprisingly rich in species heretofore quite unknown to science.

In order to make the account of the Porto Rican rusts as com-

plete as possible, the species and hosts from the new material, not mentioned in the preceding part as occurring in Porto Rico, are here appended. In order to conserve space the remainder of the 1915 material is not cited, although many additional localities are represented.

Two species were added to the previous supplementary lists, after the statistics on pages 170 and 171 were in type. One was a Porto Rican species and the other from another West Indian island. The collections of 1915 here recorded add 12 species to the foregoing record of Porto Rican rusts. The total number of species of rusts now known from Porto Rico is brought up to 135, and from all the West Indian islands to 155. Of this large rust flora Professor Stevens secured during his twenty-four months' sojourn in the West Indies all but eleven of the known species from Porto Rico, and all but thirty from the whole West Indian flora. Truly a remarkable record. His collections supplied twenty species new to science and an equal number of additional species not previously recorded for North America, beside many new hosts.

ADDITIONAL SPECIES FROM PORTO RICO

143. RAVENELIA CEBIL Speg., on *Piptadenia peregrina* (L.) Benth. (*Caesalpiniaceae*) Peñuelas, July, 1915, II, *9139*. No authentic material of this South American species has been seen, but the ample Porto Rican material, so far as uredinia are concerned, agrees closely with Spegazzini's excellent description (An. Mus. Nac. B. Aires **19**: 295. 1909). The Porto Rican host, *P. peregrina*, is placed by Engler & Prantl in the same third section of the genus *Piptadenia* as the Argentine type host, *P. macrocarpa*, evidencing near relationship. The assignment of the collection is, therefore, made with considerable confidence, although the telia are absent.

144. RAVENELIA CASSIAECOLA Atks., on *Chamaecrista Aeschynomene* (DC.) Greene (*Caesalpiniaceae*), El Gigante, July 16, 1915, II, *8505*. Heretofore this rust has been known only from the southeastern United States.

145. PUCCINIA CYNODONTIS DeLac., on *Capriola Dactylon* (L.)

Kuntze (*Cynodon Dactylon* Pers.), (*Poaceae*), Rio Piedras, June 11, 1915, II, *7009*, Mayagüez, June 16, 1915, II, *7114*.

146. UREDO PUSTULATA P. Henn., on *Stenorrhynchus lanceolatus* (Aubl.) Griseb. (*Orchidaceae*), Las Marias, July 10, 1915, *8185*. The first record of this species for North America, hitherto known only in Brazil.

147. UREDO GUACAE Mayor, on *Epidendrum difforme* Jacq. (*Orchidaceae*), Jejome Alto, July 17, 1915, *8434*, Bandera, July 15, 1915, *8669*. The same rust was collected on *Epidendrum rigidum* Jacq. at Summit Pass, south of Cayey, P. R., January, 1911, by E. W. D. Holway. It has not before been recognized as a part of the North American flora.

148. **Uredo venustula** sp. nov.

Uredinia hypophyllous, scattered, oblong or linear, 0.1–0.2 mm. broad by 0.3–0.8 mm. long, early naked, chestnut-brown, ruptured epidermis evident; paraphyses numerous, prominent upright, clavate-capitate, 16–20 by 40–55 μ, the wall chestnut-brown above, paler below, 1.5–3 μ along the stalk, 6–10 μ above; urediniospores broadly ellipsoid or globoid, 18–23 by 22–27 μ; wall light chestnut-brown, 1–1.5 μ thick, closely and finely echinulate, the pores quite distinct, 4, equatorial.

ON POACEAE:

Andropogon brevifolius Sw., Las Marias, July 10, 1915, *8147*.

A distinctive rust, with prominent sori, due to the great abundance of very dark paraphyses. The species is similar to *Uredo Kaernbachii* P. Henn., on *Andropogon Schoenanthus*, known only from the Bismark archipelago in the south seas. The color and size of both urediniospores and paraphyses are not materially different in the two forms, but the West Indian species has much thinner walls to the spores, and the sori are more prominent. Although both are on tropical grasses of wide distribution, yet they belong to different sections of the host genus, or to different genera according to some authors.

149. UREDO OLYRAE P. Henn., on *Oplismenus hirtellus* (L.) R. & S. (*Poaceae*), Las Marias, July 10, 1915, *8118*. The

thick-walled and coarsely echinulate spores without paraphyses readily distinguish this species from related forms. The type collection, with which the Porto Rican material has been compared, is from Peru, and on an undetermined species of *Olyra*. This is the second record for the species.

150. UREDO ANTHURII Hariot, on *Anthurium scandens* (Aubl.) Engler (*Araceae*), El Alto, July 16, 1915, *8716*. The host ranges from Mexico to Brazil. The fungus was described (Jour. de Bot. 1892, p. 458) from material collected on an undetermined species of *Anthurium* in the greenhouses of the Jardin des Plantes in Paris. The present record is probably the first of a collection from the field. The fungus on the Porto Rican material may be described as follows: Uredinia chiefly hypophyllous, scattered, or somewhat grouped on slightly discolored spots, bullate, the membranous epidermis tardily breaking away, pale, somewhat pulverulent, 0.5–0.8 mm. across; paraphyses and peridium none; urediniospores irregularly obovoid, 18–26 by 29–37 μ; wall colorless or nearly so, thin, 1–1.5 μ, moderately echinulate, pores not visible.

151. **Uredo globulosa** sp. nov.

Uredinia chiefly hypophyllous, numerous over the whole length of the leaf, 2–5 on well-defined, purplish-black spots, 0.5–1 mm. across, or singly without discoloration, bullate, in cross-section depressed-globose, 65–80 μ high by 150–325 μ broad, somewhat smaller when solitary; peridium usually deeply discolored, sharply delimiting the sorus from the rather loose leaf-tissue, opening by a central orifice, the cells polygonal, with walls about 2 μ thick; urediniospores stylosporic, broadly obovoid, 15–19 by 20–26 μ; wall colorless or nearly so, thin, about 1.5 μ, finely and closely echinulate, the pores obscure.

ON AMARYLLIDACEAE:

Hypoxis decumbens L., Las Marias, July 10, 1915, *8127* (type), Bandera, July 15, 1915, *8577*, *8630*.

This distinctive rust is especially notable by reason of the pedicillate spores borne in a delicate, sac-like peridium, which becomes filled with the detached spores, the whole structure lying

loosely in the tissues of the host, from which it is usually sharply defined by a deep stain. Careful search was made for telia, without success.

The same species of rust and on the same species of host was collected by E. W. D. Holway in Jalapa, Mexico, October 3, 1898, *3090*.

152. UREDO PIPERIS P. Henn., on *Peperomia hernandifolia* (Vahl) A. Dietr. (*Piperaceae*), Bandera, July 14, 1915, *8295*. The excellent material secured by Professor Stevens is placed under this Brazilian species with some hesitation, as the type has not been seen. The applicable description (Hedw. Beibl. **38**: 70. 1899), and the close relationship of the two tropical host genera, *Piper* with its 600 species, and *Peperomia* with its 400 species, however, seem to warrant the use of the name. There is a *Uredo Peperomiae* P. Henn. from Brazil, which is a distinctly different fungus.

153. **Uredo Sauvagesiae** sp. nov.

Uredinia hypophyllous, grouped on blackish-purple spots, 1–3 mm. across, round, small, 0.1 mm. in diameter, ruptured epidermis prominent, dark cinnamon-brown, subepidermal; urediniospores ellipsoid or obovoid, 17–20 by 24–27 μ; wall cinnamon-brown, thin, 1–1.5 μ, closely and finely echinulate, the pores indistinct, probably two and equatorial.

ON OCHNACEAE:

Sauvagesia erecta L., Jejome Alto, July 17, 1915, *8376*.

The host is a common tropical plant occurring around the world. No rust has heretofore been reported upon it, or upon any member of the family. The sorus is of the usual applanate sort common to the *Aecidiaceae*, without paraphyses.

154. **Uredo Hameliae** sp. nov.

Uredinia epiphyllous, loosely grouped on indefinite, slightly paler and unthickened spots 1–1.5 cm. across, applanate, round, small, 0.2–0.4 mm. across, pale cinnamon-brown; urediniospores globoid or short obovoid, 15–21 by 19–24 μ; wall pale yellowish, thin, 1 μ, distinctly echinulate with points 1–1.5 μ apart, the pores uncertain, possibly 2 and equatorial.

ON RUBIACEAE:

Hamelia erecta Jacq. (*H. patens* Jacq.), Lajos, June 17, 1915.

The material shows good development of this rather inconspicuous rust. No closely related form is known. The host genus is American; the species extends from Mexico and the West Indies to Patagonia.

155. PUCCINIA FARINACEA Long, on *Salvia coccinea* B. Juss. (*Lamiaceae*), El Gigante, July 16, 1915, *8530*. The second time the host has been reported for this rust, the first collection of it being made in Texas in 1898.

CHANGE IN NAME AND ADDED DESCRIPTION

109*a*. **Schroeteriaster fenestrala** (Arth.) comb. nov.

Uredo fenestrala Arth., Mycologia **7**: 332. 1915.

II. Uredinia, l. c.

III. Telia hypophyllous, abundant, scattered, or somewhat aggregated on yellowish, indefinite spots, punctiform, slightly elevated, dark or even blackish brown, 0.1–0.25 mm. across, subepidermal, lenticular, firm; teliospores imperfectly catenulate in chains of 2–4, closely compacted, oblong, 10–16 by 23–27 μ; wall light cinnamon-brown, thin, 1–1.5 μ, outer wall of terminal spores thicker, 3–5 μ, smooth.

ON EUPHORBIACEAE:

Phyllanthus grandifolius L., Martin Pena, Aug. 11, 1915, *9314*.

It is most fortunate that Professor Stevens was able this season to find more complete material of this interesting rust. The telia on the present collection, which consists of about twenty leaves, are abundant and well matured. They bear out the prediction, made in the introduction (p. 170), as to the genetic position.

ADDITIONAL HOSTS FOR PORTO RICAN SPECIES

15*a*. ARGOMYCES VERNONIAE Arth., on *Vernonia albicaulis* Pers., Bandera, July 15, 1915, *9048*. This makes the third species of host recorded for the rust.

18*a*. UROMYCES IGNOBILIS (Syd.) Arth., on *Sporobolus virginicus* (L.) Kunth, Camuy, Aug. 10, 1915, II, *9230*. A new host for this rust.

20*a*. UROMYCES SCLERIAE P. Henn., on *Scleria canescens* Boeckl., Jejome Alto, July 17, 1915, *8437*, El Alto, July 16, 1915, *8684*.

28*a*. UROMYCES PROEMINENS (DC.) Pass., on *Chamaesyce hypericifolia* (L.) Small, Lajas, June 18, 1915, *7171*.

34*a*. UROMYCES BIDENTIS Lagerh., on *Bidens pilosa* L., Arecibo and Lares Road, June 21, 1915, *7311*, Rio Piedras, Aug. 11, 1915, *9291*, Tanama river, July 6, 1915, *7899*, Maricao, July 20, 1915, *8979*.

38a. PUCCINIA CENCHRI Diet. & Holw., on *Cenchrus carolinianus* Walt., Camuy, Aug. 10, 1915, II, *9232*.

40*a*. PUCCINIA HUBERI P. Henn., on *Panicum fasciculatum* Sw., Tanama river, July 6, 1915, II, *7816*.

41*a*. PUCCINIA LEVIS (Sacc. & Bizz.) Magn., on *Paspalum fimbriatum* H. B. K., Cabo Rojo, July 29, 1915, II, *9074*.

42*a*. PUCCINIA SUBSTRIATA Ellis & Barth., on *Chaetochloa imberbis* (Poir.) Scribn., without locality, August, 1915, *9182*.

43*a*. PUCCINIA CANALICULATA (Schw.) Lagerh., on *Cyperus odoratus* L., San José Lagune, Aug. 10, 1915, *9223*, *9224*; Rio Piedras, Aug. 11, 1915, *9289*; *C. distans* L., without locality, 1915, *9192a*.

44*a*. PUCCINIA ELEOCHARIDIS Arth., on *Eleocharis flaccida* (Spr.) Urban, Bandero, July 15, 1915, II, *9045*; *E. mutata* (L.) R. & S., Guanajibo, June 19, 1915, II, *7198*, San José Lagune, Aug. 10, 1915, *9192*; *E. capitata* (L.) R. Br., San José Lagune, Aug. 10, 1915, *9227*, Martin Pena, Aug. 11, 1915, *9301*.

47*a*. PUCCINIA CANNAE (Wint.) P. Henn., *Calathea lutea* (Aubl.) Mey. (*Marantaceae*) Mayagüez, June 29, 1915, *7583*. The first record for a rust on this host.

67*a*. PUCCINIA LATERITIA Berk. & Curt., on *Spermacoce riparia* C. & S., Aquadilla, June 20, 1915, *7257*.

70*a*. PUCCINIA SYNDRELLAE P. Henn., on *Neurolaena lobata* (L.) R. Br., Florida Adentro, July 7, 1915, *7659*. The rust on this host, heretofore only known from Cuba, was also found by Mr. Percy Wilson in the phanerogamic herbarium of the New York Botanical Garden on a specimen from Panama, collected April 13, 1908, by R. S. Williams.

99*a*. UREDO GYMNOGRAMMES P. Henn., on *Adiantum latifolium* Lam., Las Marias, July 10, 1915, *8178*.

121*a*. UREDO ARTOCARPI B. & Br., on *Artocarpus Camansi* Blanco, without locality, August, 1915, *9179*. Some slight uncertainty exists regarding the host, as no flowers or fruit accompanied the material.

In order to make the foregoing rust flora of the West Indies more serviceable as a reference work an index has been prepared for the more than three hundred fungous names and the considerably more than four hundred host names.

INDEX TO UREDINALES OF THE WEST INDIES

New and newly combined names are in **bold face**

INDEX TO HOSTS

PURDUE UNIVERSITY, LAFAYETTE, INDIANA.

MYXOMYCETES FROM SOUTH AMERICA

WILLIAM C. STURGIS

Our knowledge of the Myxomycetes of South America is comparatively meager. Spegazzini's numerous articles upon the fungi of Argentina, Brazil, Uruguay, and Paraguay[1] contain references to Myxomycetes and describe a number of new species, several of which, however, appear, on closer examination, to be referable to already known forms. R. E. Fries[2] has listed 47 species from Argentina and Bolivia. From Brazil, Berkeley and Curtis,[3] Hennings,[4] Jahn,[5] von Höhnel,[6] and Sydow[7] have published brief lists. Johow[8] mentions a few species belonging to this group in his Flora of Juan Fernandez, Chile. Ecuador is represented by a small number included by Patouillard and Lagerheim in their "Champignons de l'Équateur,"[9] while the former observer, in collaboration with Gaillard, reports 11 species of Myxomycetes in his "Champignons du Vénézuéla."[10] Although practically all parts of South America are represented in the publications of the above observers, the number of actual species of Myxomycetes listed is surprisingly small. It is therefore gratifying to be able to add materially to our knowledge in this field.

The following species were collected by Professor Roland Thaxter in Argentina and Chile in 1905–06. The collection is deposited in the Cryptogamic Herbarium of Harvard University, and it is through the courtesy of Professor Thaxter and Dr. W.

[1] Anal. Soc. Cient. Argentina, 1881, 1886, 1888; Bol. Acad. Nac. Ciencias, 1887, 1889; Rev. Facul. Agr. y Vet., 1896; Anal. Mus. Nac. Buenos Aires, 1899, 1909.

[2] Arkiv. f. Botanik, 1906.

[3] Journ. Linn. Soc., Botany, 1877.

[4] Hedwigia, 1896. Idem, Beiblatt, 1902.

[5] Ber. Deutsch. Bot. Gesellsch., 1902; Hedwigia, 1904.

[6] Denkschr. K. Akad. Wiss. Wien, 1907.

[7] Ann. Mycol., 1907.

[8] Estud. sobre la Flora d. l. Islas de Juan Fernandez, 1896.

[9] Bull. Soc. Myc. France, 1893.

[10] Bull. Soc. Myc. France, 1888.

G. Farlow that I have had the privilege of examining it and of reporting the results. It will be noted that, although the list includes several interesting species, it has happily been unnecessary to record any new species.

CERATIOMYXA FRUTICULOSA (Muell.) Macbr. Punta Arenas, Chile, March, 1906.

CERATIOMYXA FRUTICULOSA (var. FLEXUOSA List.). Corral, Chile, December, 1905. This extremely delicate form is interesting, but seems hardly worthy of even the varietal rank given it in the Lister Monograph.

BADHAMIA PANICEA (Fr.) Rost. Buenos Aires, Argentina, December, 1905. A somewhat scanty specimen, but fairly characteristic.

PHYSARUM GLOBULIFERUM (Bull.) Pers. Corral, Chile, December, 1905.

PHYSARUM DICTYOSPERMUM List. Punta Arenas, Chile, February, 1906. It is interesting to find this apparently very rare species in Chile. The only other recorded gatherings are from New Zealand, Switzerland and Australia. The specimen from Punta Arenas agrees in every particular with the description and figures furnished by Miss Lister, except that the slender, black stalks are somewhat longer (0.7 mm.) and the black columella is clavate and attains a height of one-half to two-thirds that of the sporangium. The specimen consists of about twenty sporangia growing on a mass of decayed vegetable matter.

PHYSARUM VIRIDE (Bull.) Pers. Concepcion, Chile, November, 1905; Corral, Chile, December, 1905.

PHYSARUM POLYCEPHALUM Schw. Temperley, Argentina, April, 1906. This is the typical form, with undulate, yellow sporangia, borne in clusters on fasciculate stalks.

PHYSARUM PENETRALE Rex. Corral, Chile, December, 1905. A fine gathering, which extends considerably the known range of this species in the southern hemisphere.

PHYSARUM BRUNNEOLUM (Phill.) Mass. Punta Arenas, Chile, March, 1906. An extraordinarily robust form of this species, occurring in fair abundance on decayed wood. The dirty-white or pale-tawny sporangia are borne on stout or slender reddish-

brown stalks, and measure 1.3 to 1.8 mm. in diameter. The thick, somewhat cartilaginous wall is densely charged with lime, and splits open in an irregular manner.

PHYSARUM STRAMINIPES List. Punta Arenas, Chile, February, 1906.

PHYSARUM DIDERMOIDES (Ach.) Rost. Buenos Aires, Argentina, April, 1906.

PHYSARUM NUTANS (Bull.) Pers. Corral, Chile, November and December, 1905.

PHYSARUM LATERITIUM (Berk. & Rav.) Morg. Corral, Chile, December, 1905. This specimen shows dark, orange-red lime-knots, instead of the yellow knots with red centers usually seen in this species. But the character of both capillitium and spores is that of *P. lateritium* rather than of *P. rubiginosum,* to which otherwise the specimen shows a very close resemblance. It is very doubtful whether these two forms can be regarded as distinct species.

FULIGO SEPTICA (Linn.) Gmel. Corral, Chile, December, 1905. Punta Arenas, Chile, February, 1906.

PHYSARELLA OBLONGA (Berk. & Curt.) Morg. Palermo Park, Buenos Aires, Argentina, March, 1906.

LEOCARPUS FRAGILIS (Dicks.) Rost. Punta Arenas, Chile, February, 1906.

DIDERMA HEMISPHERICUM (Bull.) Horn. Buenos Aires, Argentina, April, 1906.

DIDERMA SPUMARIOIDES Fr. Punta Arenas, Chile, February, 1906.

DIDERMA NIVEUM (Rost.) Macbr., subsp. LYALLII (Mass.). List. Punta Arenas, Chile, February and March, 1906. These gatherings are scanty and in rather poor condition, but the material is sufficient to warrant its reference as above. In both cases the whitish, densely calcareous sporangia are provided with stout, concolorous stalks, and show whitish, more or less clavate columellae.

DIDERMA TESTACEUM (Schrad.) Pers.? Punta Arenas, Chile, March, 1906. A single gathering, consisting of a few crowded, pulvinate sporangia, none of which are mature, is doubtfully referred to this species.

DIDERMA SIMPLEX (Schroet.) List. Punta Arenas, Chile, February, 1906. This is a single very large gathering consisting of thousands of closely crowded, sessile sporangia of a pale ochraceous-brown or tawny color, almost completely covering a mixed substratum of moss, dead leaves and twigs. A specimen submitted to Miss Lister was determined by her as above.

DIDERMA TREVELYANI (Grev.) Fr. Punta Arenas, Chile, February, 1906. As compared with numerous gatherings of this species made in the United States, this Chilean specimen shows a remarkable divergence in the size of the sporangia. These measure 1.5 mm. or more in diameter. In other respects, however, they are thoroughly characteristic of the species.

DIDERMA ANTARCTICA (Speg.) Sturgis. Punta Arenas, Chile, January, 1906. In 1887 Spegazzini[11] described as "*ad truncos cariosus Fagi antarcticae in silvis prope Punta Arenas,*" a species to which he gave the name *Licea antarctica*. This species, Miss Lister (Mon. Mycet., p. 264) refers doubtfully to *Perichaena corticalis* Rost. I have not seen the type of Spegazzini's species, but the published description makes it quite evident that it does not refer to a species of *Licea,* since it includes a distinct capillitium. The gathering made by Professor Thaxter and here recorded, consists of groups of ten to fifty or more closely aggregated, sessile sporangia, subglobose or angled by mutual pressure and with smooth walls of a dark reddish brown color. The thick wall, brittle above, persistent and cartilaginous below, is closely lined throughout with a delicate membranous layer densely beset with minute, snow-white granules of lime. The columella is a rough, indeterminate, calcareous mass of a pale yellow color. The capillitium consists normally of scanty, coarse or slender threads, dark in the middle, hyaline at the extremities; occasionally of large, pale-brown, membranous, angular expansions, from which the threads radiate. The spores, black in the mass, are dark purplish-brown, paler on one side, minutely spinulose and often marked with one or more raised bands, and measure 10.5–11.5 μ in diameter. That this description coincides very closely with that of *Licea antarctica* there can be no doubt. The probability that the two gatherings represent one and the same species is

[11] Fungi Patagonici. In Bol. Acad. Nac. Ciencias, Cordoba, 11: 56.

emphasized by the fact that both occurred on *Fagus antarctica,* and in precisely the same narrowly limited locality.[12] The specimen under consideration belongs in the *Leangium* group of the genus *Diderma,* and I feel justified in uniting with it the form recorded by Dr. Spegazzini.

DIACHAEA LEUCOPODA (Bull.) Rost. Buenos Aires, Argentina, October, 1905.

DIACHAEA LEUCOPODA var. GLOBOSA List. Punta Arenas, Chile, February, 1906. A remarkably fine gathering of this rare form, showing both stipitate and sessile sporangia.

DIDYMIUM CLAVUS (Alb. & Schw.) Rost. Llavallol, Argentina, April, 1906.

DIDYMIUM MELANOSPERMUM (Pers.) Macbr. Buenos Aires, Argentina, March, 1906.

STEMONITIS FUSCA Roth. Corral, Chile, December, 1905; Punta Arenas, Chile, February, 1906; Buenos Aires, Argentina, March, 1906.

STEMONITIS FUSCA var. DICTYOSPORA (Rost.). A fine gathering of this variety, showing an imperfect surface net and spores marked by raised bands forming a complete reticulation and a distinct border. In the size and habit of the sporangia this specimen is precisely like normal *S. fusca.* The absence of a surface net, and the spore-sculpture, however, connect it with Rostafinski's *S. dictyospora.* Miss Lister applies to this form the name *S. trechispora.* This name originated with Berkeley and first appears in connection with a specimen collected in Venezuela by Fendler. A portion of this gathering is in the Curtis Herbarium at Harvard University and bears the label "*Stemonitis trechispora,* B. & C." Under his *S. dictyospora,* Rostafinski (Mycet. Monog., App., p. 27) quotes three specimens, from Cuba, Ceylon, and Venezuela, respectively. The first-named was presumably the type of the species, but I find no record of the existence of this specimen. The second appears to be properly referable to *S. fusca* var. *rufescens* (cf. Lister, Mon. Mycet., Ed. 2, p. 145). The third is the gathering represented in the Kew, British Museum, and Curtis herbaria, and named by Rostafinski *S. dictyospora.* Although this specimen bears the manuscript name *S.*

[12] Professor Thaxter informs me that there is only one wooded area readily accessible from Punta Arenas.

trechispora, that name was never published and is discarded by Rostafinski except as a synonym for his *S. dictyospora.* Torrend (Fl. Myx., p. 141) disregards Rostafinski's authority in the matter and reverts to the earlier name, although the latter was evidently a *nomen nudum.* Massee (Mon. Myx., p. 84) rightly accepts the name *S. dictyospora* Rost. for the Venezuela specimen, while deploring the fact that Rostafinski did not see fit to validate the earlier name. It seems to me that Massee's conclusion is the only correct one, though I can not concur with him in giving to these banded-spored specimens anything more than a varietal position.

STEMONITIS SPLENDENS Rost. Punta Arenas, Chile, February, 1906; Palermo, Argentina, March and April, 1906.

STEMONITIS SPLENDENS var. WEBBERI (Rex) List. Punta Arenas, Chile, March, 1906.

STEMONITIS HERBATICA Peck. Palermo, Argentina, March, 1906.

STEMONITIS FERRUGINEA Ehr. Corral, Chile, December, 1905; Punta Arenas, Chile, February, 1906.

COMATRICHA NIGRA (Pers.) Schroet. Punta Arenas, Chile, February and March, 1906.

COMATRICHA TYPHOIDES (Bull.) Rost. Corral, Chile, December, 1905; Palermo, Argentina, March, 1906.

COMATRICHA TYPHOIDES var. HETEROSPORA Rex. Punta Arenas, Chile, March, 1906. A number of gatherings of this form show the same date and locality. In most of them the sporangia are of the usual narrowly cylindrical shape; some, however, exhibit tufts of rather dark sporangia, almost sessile, and measuring only 1.5 mm. in height by over 1 mm. in diameter. In these latter specimens the spores have a faintly reticulated surface, but the characteristic, scattered warts are barely, if at all, apparent. Such specimens evidently approach the dwarf forms of *Stemonitis fusca.*

ENERTHENEMA PAPILLATUM (Pers.) Rost. Punta Arenas, Chile, February, 1906.

CLASTODERMA DEBARYANUM Blytt. Corral, Chile, December, 1905. This rare species is represented by a single very large gathering in fine condition. It is typical in every respect.

CRIBRARIA MACROCARPA Schrad. Punta Arenas, Chile, March, 1906. A scanty gathering in poor condition.

CRIBRARIA SPLENDENS (Schrad.) Pers. Punta Arenas, Chile, February, 1906.

CRIBRARIA PYRIFORMIS Schrad. Punta Arenas, Chile, March, 1906.

DICTYDIUM CANCELLATUM (Batsch) Macbr. Punta Arenas, Chile, March, 1906. The single gathering of this common species included in this collection is a remarkable one. The sixty or more sporangia all show a very delicate, persistent, membranous wall, imparting to the sporangia a certain degree of iridescence. In most cases the wall is not thickened below to form a cup, but in others the cup is one-third to one-half the height of the sporangium and, in such cases, is marked with a network composed of lines of plasmodic granules, which network is continued in the upper part of the sporangium precisely as in the genus *Cribraria*. In fact, such sporangia present a remarkable resemblance to *C. pyriformis*. When the cup is absent, its place is taken by strong ribs, occasionally connected by delicate cross threads as in typical *Dictydium*, but usually anastomosing at acute angles below and forming a typical *Cribraria* net above, either with or without slightly thickened nodes. Such sporangia show a very near approach to *Cribraria splendens*. Only here and there in the gathering is to be found a sporangium the structure of which is throughout that of normal *Dictydium*.

TUBIFERA FERRUGINOSA (Batsch) Gmel. Punta Arenas, Chile, March, 1906.

DICTYDIAETHALIUM PLUMBEUM (Schum.) Rost. Corral, Chile, December, 1905. This is the gathering referred to by Miss Lister (Mon. Mycet., p. 196). The specimen is badly weathered, being detached entirely from the substratum, and showing only the persistent apices and characteristic lateral portions of the sporangia. The latter are peculiar in being unusually coarse (8–10 μ diam.); their length indicates that the aethalium measured 1.5 mm. or more in thickness; otherwise the specimen appears to be quite normal.

RETICULARIA LYCOPERDON Bull. Corral, Chile, December, 1905; Punta Arenas, Chile, 1906.

LYCOGALA FLAVO-FUSCUM (Ehr.) Rost. Llavallol, Argentina, April, 1906.

LYCOGALA EPIDENDRUM (Linn.) Fr. Corral, Chile, December, 1905; Punta Arenas, Chile, February, 1906.

TRICHIA FAVOGINEA (Batsch) Pers. Punta Arenas, Chile, February, 1905.

TRICHIA VERRUCOSA Berk. Corral, Chile, December, 1905; Punta Arenas, Chile, February, 1906.

TRICHIA AFFINIS D. By. Corral, Chile, December, 1905.

TRICHIA PERSIMILIS Karst. Concepcion, Chile, November, 1905.

TRICHIA DECIPIENS (Pers.) Macbr. Punta Arenas, Chile, February and March, 1906. These specimens vary considerably in general appearance from that usually presented. The sporangia are yellowish clay-colored, in some cases almost or quite sessile, and the upper half of the wall breaks away in an even line, leaving the lower portion as a well-defined cup. These crowded, nearly sessile sporangia bear a peculiar resemblance to those of *Cribraria argillacea*.

TRICHIA BOTRYTIS Pers. Corral, Chile, December, 1905; Punta Arenas, Chile, February, 1906.

TRICHIA BOTRYTIS var. MUNDA List. Corral, Chile, December, 1905.

HEMITRICHIA CLAVATA (Pers.) Rost. Corral, Chile, December, 1905.

ARCYRIA CINEREA (Bull.) Pers. Llavallol, Argentina, April, 1906.

ARCYRIA DENUDATA (Linn.) Sheldon. Corral, Chile, December, 1905.

ARCYRIA INSIGNIS Kalchbr. & Cke. Llavallol, Argentina, March, 1906. This specimen lacks the characteristic color, being weathered to a dull-yellowish-brown. In other respects it is typical.

ARCYRIA INCARNATA Pers. Concepcion, Chile, November, 1905; Punta Arenas, Chile, March, 1906.

MARGARITA METALLICA (Berk. & Br.) List. Punta Arenas, Chile, March, 1906.

CAMBRIDGE, MASS.

STUDIES IN PORTO RICAN PARASITIC FUNGI—II

ESTHER YOUNG

In the May number of *Mycologia*, there appeared a report by the writer of this article which was the first of a series on Porto Rican Parasitic Fungi. A second article, by Mr. Garman, was published in the November number of *Mycologia*. This is the third of the series and is a report on the genus *Cercospora*. The work was done according to the method used in work reported in the first paper, when acknowledgments were made for valuable assistance rendered. The specimens were all collected by Dr. F. L. Stevens during the years 1912 and 1913 and the material is in the herbarium of the University of Illinois.

1. CERCOSPORA CONSPICUA Earle, Bull. N. Y. Bot. Gard. **3**: 312. 1904

On leaves of *Cleome* in Porto Rico: Mayagüez, *6728;* ——, *19.*

2. CERCOSPORA PORTORICENSIS Earle, Muhlenbergia **1**: 15. 1901

On leaves of *Piper hispidum* in Porto Rico: Maricao, *4792, 4802;* Rosario, *4804.*

3. CERCOSPORA CAJANI P. Henn. Hedwigia **41**: 309. 1902

On leaves of *Cajanus indicus* in Porto Rico: Aquas Buenas, *294;* Aquada, *5100;* Maricao, *4832;* Anasco, *3556;* Dos Bocas below Utuado, *6572, 6058, 6029;* Guayanilla, *5874;* Luguillo Forest, *5608;* Hormigueros, *226;* Monte de Oro, *5735.*

4. CERCOSPORA VAGINAE Kreuger, Walker & Went. Mededeel. Profest. Suiker. West-Java **24**: 8. 1896

On leaves of *Saccharum officinalis* in Porto Rico: Johnston *7001.*

5. CERCOSPORA MUCUNAE Syd. Bibl. Hedwigia **42**: 136. 1903

On leaves of *Mucuna pruriens* in Porto Rico: Anasco, *3601;* San German, *250; Utuado, 4685, 4691;* Dos Bocas below Utuado, *6555, 6009;* Mayagüez, *3951;* Anasco, *3535;* Rosario, *3779, 4704;* Monte Alligrillo, *4779;* Rosario, *4806;* Utuado, *4929.*

6. CERCOSPORA ROSICOLA (Pass.) Sacc. Fungi Ital. *pl. 665*

On leaves of *Rosa* in Porto Rico: Maricao, *3447, 737, 4806.*

7. CERCOSPORA BLOXAMI Berk. & Br.

Spots spherical to ovate, 2–5 mm. in diameter, sordid-white to yellowish-brown, margin slightly darker; conidiophores fasciculate, simple, fuscus, paler at the tips, conidial scars evident, 1–2-septate, 75.6–162 × 5.4–7.2 μ; conidia elongate-fusiform, acuminate at one end, 5–7-septate, hyaline, 50.4–144 × 2.7–3.6 μ.

On leaves of *Brassica rapae* and *B. napi* in Porto Rico; Quebradillos, *5121;* Bayamon, *449.*

This differs from *C. Armoraciae* and *C. brassicola* in size and shape of conidia, and in size of conidiophores.

The original description of *Cercospora Bloxami* on *Brassica* is very meager, lacking in many of the essential characters and measurements. The present emended description is drawn from the Porto Rican specimens.

8. CERCOSPORA HYDROPIPERIS (Thüm.) Speg. Anal. Soc. Sci. Argent. **1**: 191. 1867

Helminthosporium Hydropiperis Thüm. Myc. Univ. n. 1087.
Cercospora Polygonorum Cooke, Hedwigia **17**: 39. 1878.

On leaves of *Polygonum punctata* in Porto Rico: Utuado, *4586, 4578;* Coamo, *91;* ——, *91;* Corozal, *419;* Ciales, *27;* Mayagüez, *1154.*

9. CERCOSPORA LEPIDII Peck, Ann. Rep. N. Y. State Mus. **35**: 140. 1884

On leaves of *Lepidium* sp. in Porto Rico: Mona Island, *6352.*

10. CERCOSPORA HIBISCI Tracy & Earle, Bull. Torrey Club **22**: 179. 1895

On leaves of *Hibiscus tiliaceus* in Porto Rico: Rosario, *3793;* Las Marias, *310;* Dos Bocas below Utuado, *6618, 6564;* Maricao, *4797;* Rio Maricao above Maricao, *3630.*

11. CERCOSPORA PHYLLITIDIS Hume, Bull. Torrey Club **27**: 577. 1900

On leaves of *Polypodium* sp. in Porto Rico: Barros, *121.*

12. CERCOSPORA AMARYLLIDIS Ellis & Ev. Jour. Myc. **3**: 14, 1887

On leaves of *Hymenocallis* sp. in Porto Rico: Santurce, *244;* Coamo, *836.*

13. CERCOSPORA DENSISSIMA Speg. 1899

On leaves of *Sida* sp. in Porto Rico: Mona Island, *6361, 6354.*

14. CERCOSPORA CASSAVAE Ellis & Ev. Bull. Torrey Club **22**: 438. 1895

On leaves of *Cassava* sp. in Porto Rico: Dos Bocas below Utuado, *6557.*

Our material differs slightly from the description in that the conidiophores are longer, and sometimes septate, and are brown in color with hyaline tips.

15. CERCOSPORA CHAMAECRISTAE Ellis & Kellerman, Jour. Myc. **4**: 7. 1888

On leaves of *Cassia occidentalis* and *C. alata* in Porto Rico: Dos Bocas below Utuado, *6054;* Santurce, *269a;* Anasco, *3586;* Mayagüez, *1276.*

In our specimens, the host *C. occidentalis* has a definite spot; the length of the conidiophores is slightly different from the description, being as long as 216 μ; conidia usually 3–5-septate.

16. **Cercospora maricaoensis** sp. nov.

Spots diffuse, brown, scattered over the leaf, amphigenous, more numerous below; conidiophores often branched, loosely fascicu-

late, septate, pale-olivaceous, 54–144 × 5.4–7.2 μ; conidia oblong-cylindrical, hyaline, sometimes slightly curved, 3–5 septate, 36–81 × 3.6–5.4 μ.

On leaves of *Teramnus uncinatus* (L.) Sw. in Porto Rico: Maricao, *764;* Dos Bocas below Utuado, *6554* (type); ——, *5815;* Cabo Rojo, *2271.*

17. **Cercospora boringuensis** sp. nov.

Spots definite, amphigenous, reddish-brown, varying from spherical to irregular, often coalescing and forming large, brown patches on the leaves; conidiophores fasciculate, simple, septate, brown, 72–144 × 3.6–5.4 μ; conidia clavate, slightly curved, hyaline, 3–7-septate, 36–54 × 5.4–7.2 μ.

On leaves of *Calapogonium orthocarpum* Urban in Porto Rico: Mayagüez, *6752* (type).

18. **Cercospora Stevensii** sp. nov.

Spots amphigenous, reddish-brown above, black below, 1–2 mm. in diameter; conidiophores densely fasciculate, simple, cylindrical, brown, septate, some peculiarly twisted; conidia hyaline, oblong-cylindric, often slightly curved, septate, granular, 32.4–72 × 3.6–6.3 μ.

On leaves of *Andira* sp. in Porto Rico: Dos Bocas below Utuado, *600* (type), *6549.*

19. **Cercospora guanicensis** sp. nov.

Spots amphigenous, spherical to ovate, yellow to greenish-brown above, reddish-brown below, conidiophores, densely fasciculate, septate, unbranched, 76–96 × 4.8 μ; conidia oblong-cylindric, subhyaline, slightly curved, 3–6-septate, granular, 39.6–96 × 3.6–7.2 μ.

On leaves of *Guilandina crista* in Porto Rico: Guanica, *6840* (type), *6845.*

Associated with this is a species of *Dothidella.*

20. **Cercospora Malachrae** sp. nov.

Spots amphigenous, spherical, 2–5 mm. in diameter, scattered, the centers white, surrounded by a black, slightly elevated margin, the portion of the leaf about the spot reddish-purple to purplish-black, often large areas infected; conidiophores fascicu-

late, dark-brown, few septate, 63–144 × 3.6–5.4 μ; conidia hyaline, cylindrical, 90–108 × 3.6 μ.

On leaves of *Malachra rotundifolia* in Porto Rico: San Sebastian, *5199* (type); Ponce, *5003;* Guanica, *338a;* Yauco, *3246;* San German, *5840;* Vega Baja, *431, 381.*

21. **Cercospora Bradburyae** sp. nov.

Spots amphigenous, varying from definite, spherical, 1–2 mm. in diameter to diffuse, yellowish-brown to rusty-red; conidiophores densely fasciculate, simple, fuscus, 12–36 × 3.6–4.8 μ; conidia elongate-cylindrical, hyaline, 5–7-septate, 48–96 × 2.4–3.6 μ.

On leaves of *Bradburya pubescens* in Porto Rico: Mayagüez, *6296, 3930, 479;* Luguillo Forest, *5609;* Dos Bocas below Utuado, *6558;* San German, *5796, 5833, 5785;* Guayama, *5412;* Jayuya, *446a;* Hormigueros, *225a;* Caba Rojo, *6482;* Rosario, *446* (type).

UNIVERSITY OF ILLINOIS,
URBANA, ILLINOIS.

INDEX TO ILLUSTRATIONS OF FUNGI I–XXII

WILLIAM A. MURRILL

This series of twenty-two illustrated articles on the larger fungi was begun with the first volume of *Mycologia* in 1909 and has been continued regularly each year since. During this time, 184 species have been described and figured, 27 of them from photographs and the remaining 157 from water-color paintings prepared by Mr. Edward C. Volkert. The specimens used have been mostly collected in the vicinity of New York City, but a few came from Massachusetts. Many important edible and poisonous fungi have been included in the treatment.

NEW YORK BOTANICAL GARDEN.

NOTES AND BRIEF ARTICLES

Excellent specimens of *Polyporus amorphus* collected at State College, Pa., by C. R. Orton were sent to the Garden herbarium in a fresh condition by Mr. L. O. Overholts on September 22. They were found growing on dead pine wood and running over pine needles on the ground. The species has no doubt been confused with *P. dichrous* in this country.

A specimen of the rare *Panaeolus epimyces* on *Coprinus comatus* was sent in from Pittsford, New York, on October 25, 1915, by Mr. Fred S. Boughton, and a colored drawing of the plant was obtained. The host was turbinate in general outline and depressed about the stipe of the *Panaeolus*, resembling the enlarged base of an *Amanita* with a conspicuous, thickened volva. Attention is called to Mr. E. T. Harper's article in MYCOLOGIA **5**: 167. 1913, and to the papers he cites on this subject.

Auricularia Auricula (L.) Underw., commonly known as the Jew's ear fungus, has been studied by M. J. Le Goc in the vicinity of Cambridge, England, where it is common on elder and less common on elm. Pure cultures of the fungus grow readily on elder, lime, and elm wood, producing rudimentary fructifications. Penetration, delignification, and almost complete consumption of the wood quickly follow natural infection with the fungus. Inoculations on healthy living twigs of elder were often successful, the hyphae penetrating slowly at first, but finally killing the twigs.

A collection of Thelephoraceae made in Jamaica in 1908 and 1909 by W. A. Murrill and Edna L. Murrill has recently been determined by Dr. E. A. Burt, who is publishing a series of articles on this family in the *Annals of the Missouri Botanical Garden*. Of the 45 species recognized, representing 12 genera, 8 of them are new and some of the more difficult material in the col-

lction remains to be investigated. *Cyphella porrigens* Burt, Ann. Mo. Bot. Gard. 1: 368. 1914, and *Thelephora magnispora* Burt, Ann. Mo. Bot. Gard. 1: 211. 1914, were described from this collection.

A box of miscellaneous fleshy and woody fungi from Alberta, containing nearly 100 specimens collected last season in the vicinity of Banff by Mr. N. B. Sanson, Curator of the Dominion Government Museum, has recently been sent to the Garden herbarium. Among the species in this collection are: *Armillaria evanescens, Ceriomyces viscidus, Clavaria pistillaris, Coprinus comatus, Coriolus pubescens, Corticium pezizoideum, Cortinellus vaccinus, Hydnum imbricatum, Melanoleuca melaleuca, Pholiota candicans, Rostkovites granulatus, Scutiger Whiteae, Dasyscypha arida, Geopyxis vulcanalis, Helvella crispa, Herpotrichia nigra, Hypocrea Richardsoni, Morchella crassipes,* and *Otidea Auricula.*

It is interesting to observe the gradual addition of new elements in the fungous flora of the Garden as the introduction and development of new shrubs and trees prepares the way for them. Several years ago, a single hymenophore of *Boletus luteus* was found under a young pine tree east of the large range of public conservatories. The past autumn, about the middle of October, a large basketful of very fine specimens was gathered there and many more were found under the pines to the north of the range. When Dr. Murrill collected on the Tacoma Prairies in Washington, he found an interesting series of fungi which had been introduced after the land was occupied by scattered clumps of conifers.

Studies in the Agarics of Denmark, by Jakob E. Lange, are appearing in parts in the *Dansk Botanisk Arkiv.* Part 1 appeared in 1914 in the first volume of this periodical and included a general introduction and a treatment of the genus *Mycena.* Part 2 appeared in 1915 and included *Amanita* (14 species), *Lepiota* (31 species), and *Coprinus* (33 species), with keys and descriptions of all species and two plates of illustrations. The author considers *Amanitopsis* a subgenus of *Amanita* and *Armillaria* a

subgenus of *Lepiota,* while *Psathyrella disseminata* and *P. impatiens* are transferred to *Coprinus,* following the opinion of Quélet. Three new species, *Lepiota Cortinarius, Coprinus Hansenii,* and *Coprinus bisporus* are described in this part.

A separate from the report of the New York State Botanist for 1914 giving keys and descriptions of the species of *Marasmius* occurring in the state appeared in December, 1915. This paper was prepared by Professor L. H. Pennington, of Syracuse University, whose work on the species of *Marasmius* occurring in temperate North America appeared in Volume 9, part 4, of *North American Flora,* issued in April, 1915. Dr. Pennington reported 71 species of this genus from temperate North America and his list of species from New York includes 61 species. This means that there are still many undescribed species in other states to be discovered and published. Species of *Marasmius* aid greatly in the formation of humus, and they very rarely cause plant disease. The common fairy ring fungus, *Marasmius caryophylleus,* is a weak parasite of grasses, and this species is practically the only one in the genus which is used for food.

A very interesting and important list of the fungi of North Elba, New York, which contains many additions to Peck's list of North Elba plants published in 1899, appeared in December, 1915, as a separate from the report of the state botanist for 1914. This list was prepared by Professor C. H. Kauffman, of the University of Michigan, after three weeks' collecting in the vicinity of Newman in September, 1914, assisted by Mr. E. B. Mains, who gave special attention to the rusts and ascomycetes. The region covered was small, but the season was unusually good. Two new species are published in this paper, *Boletus rubritubifer* Kauffm., found under spruce trees, and *Cortinarius chrysolitus* Kauffm., found in a sphagnum swamp under balsam trees.

The chestnut canker is reported in at least two localities in Nebraska, having been shipped there with nursery stock. The effect of the canker on chinquapin in Virginia is being observed

and studied by Rogers and Gravatt, who find by inoculations that this tree is no less resistant than the chestnut, but, being less subject to insect attacks and other injuries, it enjoys greater freedom from the disease in the field. The chinquapin grows very poorly in the latitude of New York City, but the few plants observed here show a marked resistance to the canker. Among the new plant introductions ready for distribution by the Bureau of Plant Industry, are the Chinese chestnut, *Castanea mollissima,* collected in northern China where the canker has probably existed for centuries; and a hybrid between the American chinquapin and the Japanese chestnut produced at Chico, California, by Dr. Walter Van Fleet. Both of these trees are said to be, as one would expect, highly resistant to the canker.

The annual report of the New York State Botanist for 1914, distributed as Museum Bulletin 179, was issued in December, 1915. Two mycological contributions to this report, by Dr. Pennington and Dr. Kauffman, were issued separately in advance and have been noted above. Descriptions of many new and interesting species of fungi are contributed by Dr. Homer D. House, now State Botanist, among which are the following:

New species by Dearness and House: *Aecidium lini, Cercospora argythamniae, C. namae, Cylindrosporium spigeliae, Laestadia galactina, Macrophoma celtidicola, M. peckiana, Phyllosticta baccharidis, P. maurandiae, P. medeolae, P. oakesiae, P. pachysandrae, P. rhexiae, Placosphaeria celtidis, Ramularia delphinii, Septoria darlingtoniae, S. erythraeae, S. tinctoria,* and *Thyridium ceanothi.*

New names and combinations: *Hebeloma peckii* House, nom. nov., *Melanopsamma waghornei* House, nom. nov., and *Phyllosticta raui* Dearness and House, comb. nov.

While collecting cacti in South America last year, Dr. J. N. Rose picked up a number of fungi which are of special interest as indicating the close connection existing between the flora of tropical North America and that of Brazil. He obtained about 100 numbers; most of them in the mountains about Rio de Ja-

neiro, while a few came from Argentina. Only one desert form was found, a species of *Tylostoma*, represented by a single sporophore. A few of the forest forms are listed below:

Auricularia Auricula, Chlorosplenium aeruginosum, Cladoderris dendritica, Coriolopsis occidentalis, Coriolus haedinus, C. membranaceus, C. pinsitus, C. sector, Daedalea amanitoides, Elfvingia tornata, Elfvingiella fasciata, Favolus variegatus, Fomitella supina, Hapalopilus gilvus, Hexagona daedalea, Lentinus crinitus, L. strigosus, Panaeolus campanulatus, Pogonomyces hydnoides, Psathyrella disseminata, Pycnoporus sanguineus, Resupinatus subbarbatulus, Rigidoporus surinamensis, Schizophyllus alneus, Simblum sphaerocephalum?, Stereum bicolor, and *S. lobatum.*

A NEW FAMILY OF HYMENOMYCETES

The genus *Porothelium*, erected by Fries in 1818 on *Boletus fimbriatus* Pers. and one other species, is out of place among the Polyporaceae because of its spiny hymenium and cannot properly be included in the Hydnaceae because its spines are hollow and bear spores on their inner surface. The new family **Porotheliaceae** is therefore proposed to include hymenomycetes having the hymenium composed of tubular teeth, the context being similar in general to that found in the two related families, the Polyporaceae and the Hydnaceae. The name of the genus on which this family is based was originally written *Porotheleum* (Fries, Obs. Myc. **2**: 272. 1818), but was soon afterwards changed to the form now in current use.

W. A. MURRILL.

A NEW GENUS OF RESUPINATE POLYPORES

Xanthoporia gen. nov.

Hymenophore annual, epixylous, resupinate; subiculum membranous, dirty-white; tubes long, angular, thin-walled, at first whitish, soon colored by the spores, which are yellow, smooth, ovoid, copious; spines few, at first conic, then elongate.

Type species: *Mucronoporus Andersoni* Ellis & Ev.

Xanthoporia Andersoni (Ellis & Ev.)

Mucronoporus Andersoni Ellis & Ev. Jour. Myc. **6**: 79. 1890.
Polyporus xanthosporus Underw. Proc. Ind. Acad. Sci. **1893**: 61. 1894.

This interesting species was first described from specimens collected by F. W. Anderson under the bark of an oak log at Newfield, New Jersey, in April, 1890. Owing to its peculiar habitat, the plant is rarely found, although the copious yellow spores, which sift through cracks in the bark and cover surrounding objects, had probably been known for some time.

In October, 1893, Underwood collected this species in quantity beneath the bark of dead poplar logs near Terre Haute, Indiana, describing it as *Polyporus xanthosporus*. The following June it was found on an oak trunk near Emma, Missouri; and in December, 1895, C. G. Lloyd collected it on a dead elm or poplar log near Cincinnati, Ohio.

W. A. MURRILL.

FINK'S ASCOMYCETES OF OHIO

A treatment of the ascomycetes of Ohio is begun in Volume 2, No. 1, of the *Ohio Biological Survey*. The work has been undertaken by Professor Bruce Fink and collaborators, of Miami University.

The first part of this work consists of a preliminary discussion of the classification of the ascomycetes. After a rather full discussion of the morphology and the various theories relating to the origin of the ascomycetes, a tentative scheme is proposed for the taxonomic treatment of the ascomycetes of Ohio. While the work is undertaken as a local matter, the principal orders and families of the ascomycetes are considered so that the scheme with some modification will apply equally well in a much broader sense to the ascomycetes of North America.

It is worthy of note that in this scheme Fink has followed the modern trend of thought in disposing of the lichens by distributing them among the true fungi. In many cases they are simply disposed of in large groups, each order or family being placed in its proper place among the orders and families of fungi. Some

lichen genera are still further distributed by infiltrating them into existing families of fungi.

The second part of the work consists of a treatment of the Collemaceae of Ohio. Sixteen species of the family are recognized for Ohio, three of which are described as new.

This and similar lists are not only of local value but are also of inestimable value to the student of North American ascomycetes, especially those who are concerned with monographic work on the various groups of ascomycetes for *North American Flora*.

F. J. SEAVER.

TESTIMONIAL TO PROFESSOR CHARLES HORTON PECK

The friends and colleagues of Professor Peck, who recently retired from the position of New York State Botanist after nearly fifty years of service, have expressed a wish to commemorate his important labors in the field of mycology by placing in the new rooms of the New York State Museum an exhibit of reproductions of the edible and poisonous fungi of New York. The preparation of this series has been assigned to Mr. Henri Marchand, whose reproductions from nature, both in structural detail and in coloring are of extraordinary beauty and fidelity, and twelve clusters of fungi have already been completed. It is desirable to finish the work this winter, as preliminary casts have already been prepared of a large number of subjects. Contributions to this very worthy and important undertaking may be sent to Dr. John M. Clarke, Director, State Museum, Education Building, Albany, N. Y.

INDEX TO AMERICAN MYCOLOGICAL LITERATURE

Atkinson, G. F. Morphology and development of *Agaricus Rodmani*. Proc. Am. Philos. Soc. **54**: 309–343. *pl. 7–13* + *f. 1–8*. S 1915.

Babcock, D. C. Mushrooms—edible and poisonous. Ohio Agr. Sta. Circ. 153: 89–92. *f. 1–3*. 1 My 1915.

Bailey, F. D. Powdery scab of potatoes in Oregon. Science II. **42**: 424, 425. 24 S 1915.

Bartholomew, E. T. A pathological and physiological study of the black heart of potato tubers. Centralb. Bakt. Zweite Abt. **43**: 609–639. *pl. 1–3*. 4 Je 1915.

Blakeslee, A. F. Sexual reactions between hermaphroditic and dioecious Mucors. Biol. Bull. **29**: 87–102. *pl. 1–3* + *f. 1, 2*. Au 1915.

Brown, N. A. A bacterial disease of lettuce. Jour. Agr. Research **4**: 475–478. 16 Au 1915.

Bryan, M. K. A nasturtium wilt caused by *Bacterium solanacearum*. Jour. Agr. Research **4**: 451–457. *pl. 63–66* + *f. 1–3*. 16 Au 1915.

Buller, A. H. R. Die Erzeugung und Befreiung der sporen bei *Coprinus sterquilinus*. Jahr. Wiss. Bot. **56**: 299–329. *pl. 2, 3* + *f. 1, 2*. 1915.

Burt, E. A. The Thelephoraceae of North America—IV. Ann Missouri Bot. Gard. **2**: 627–628. *pl. 21*. S 1915.

Carpenter, C. W. Some potato tuber-rots caused by species of *Fusarium*. Jour. Agr. Research **5**: 183–210. *pl. a, b, 14–19*. 1 N 1915.

Chivers, A. H. A monograph of the genera *Chaetomium* and *Ascotricha*. Mem. Torrey Club **14**: 155–240. *pl. 6–17*. 10 Je 1915.

Compere, G. Blight-resistant pear stocks. Monthly Bull. Calif. State Comm. Hort. **4**: 313–315. *f. 67, 68.* Jl 1915.

Dodge, B. O. The effect of the host on the morphology of certain species of *Gymnosporangium*. Bull. Torrey Club **42**: 519–542. *pl. 28, 29.* N 1915.

Duggar, B. M. *Rhizoctonia crocarum* (Pers.) DC. and *R. Solani* Kühn (*Corticium vagum* B. & C.) with notes on other species. Ann. Missouri Bot. Gard. **2**: 403–458. *f. 1–9.* S 1915.

Durfee, T. Lichens of the Mount Monadnock region, New Hampshire. No. 6. Bryologist **18**: 51. 21 S 1915.

Eastham, J. W. Powdery scab of potatoes (*Spongospora subterranea* (Wallr.) Johns). Canada Agr. Exp. Farms Circ. 5: 7–13. *f. 1–5.* F 1914.

Edgerton, C. W. *Citrus* canker. Louisiana Agr. Exp. Sta. Bull. 150: 1–10. *pl. 1, 2.* O 1914.

Edgerton, C. W. Effect of temperature on *Glomerella*. Phytopathology **5**: 247–259. *f. 1–4.* O 1915.

Edgerton, C. W., and Moreland, C. C. The bean blight and preservation and treatment of bean seed. Louisiana Agr. Exp. Sta. Bull. 139: 1–43. *pl. 1–6.* Ja 1913.

Edgerton, C. W., and Moreland, C. C. The tomato diseases. Louisiana Agr. Exp. Sta. Bull. 142: 1–18. *f. 1, 2.* Ap 1914.

Fraser, W. P. The cereal rusts. Ann. Rep. Quebec Soc. for Protection of Plants from Insects and Fungous Diseases 7: 116–120. 1915.

Gloyer, W. O. *Ascochyta clematidina,* the cause of stem-rot and leaf-spot of *Clematis*. N. Y. Agr. Exp. Sta. Tech. Bull. 44: 3–14. *pl. 1–5.* Au 1915.

Hasse, H. E. Additions to the lichen flora of southern California. No. 11. Bryologist **18**: 92–94. S 1915.

Hauman-Merck, L. Les parasites végétaux des plantes cultivées en Argentine et dans les régions limitrophes. An. Mus. Nac. Buenos Aires **26**: 163–225. *f. 1–6.* 1915.

Hawkins, L. A. The utilization of certain pentoses and compounds of pentoses by *Glomerella cingulata*. Am. Jour. Bot. **2**: 375–388. O 1915.

Hedgcock, G. G. Parasitism of *Comandra umbellata*. Jour. Agr. Research **5**: 133–135. 18 O 1915.

Hesler, L. R. Apple cankers and their control. Cornell Agr. Exp. Sta. Circ. *28*: 17–28. *f. 1–16*. My 1915.

Howe, R. H. The genus *Cetraria* as represented in the United States and Canada. Torreya **15**: 213–230. *f. 1–10*. O 1915.

Howe, R. H. The Usneas of the world, 1752–1914, with citations, type localities, original descriptions, and keys. Part II. South America. Bryologist **18**: 38–43. 15 Je 1915; 52–63. *f. 1*. 21 S 1915.

Humphrey, C. J., and Fleming, R. M. The toxicity to fungi of various oils and salts, particularly those used in wood preservation. U. S. Dept. Agr. Bull. *227*: 1–38. *pl. 1–4*. 23 Au 1915.

Johnston, J. R. La enfermedad del platano en Cuba. Cuba Estac. Exp. Agron. Circ. 47: 1–13. *pl. 1–7*. 1915.

Keitt, G. W. Simple technique for isolating single-spore strains of certain types of fungi. Phytopathology **5**: 266–269. *f. 1*. O 1915.

Lloyd, C. G. Synopsis of the section Apus of the genus *Polyporus*. 291–392. *f. 631–706*. Cincinnati. Je 1915.

Ludwig, C. A. Notes on some North American rusts with caeoma-like sori. Phytopathology **5**: 273–281. O 1915.

Includes *Caeoma dubium* sp. nov.

Meinecke, E. P. Spore measurements. Science II. **42**: 430, 431. 24 S 1915.

Melchers, L. E. A new alfalfa leaf-spot in America. Science II. **42**: 536, 537. 15 O 1915.

Murrill, W. A. The genus *Clitocybe* in North America. Mycologia **7**: 256–283. *pl. 164–166*. S 1915.

Includes descriptions of three new species.

Murrill, W. A. Illustrations of fungi—XXII. Mycologia **7**: 221–226. *pl. 163.* S 1915.

Cortinarius roseipallidus sp. nov., *C. erythrinus, C. anomalus, Melanoleuca Russula, Gymnopilus farinaceus* sp. nov., *Russula crustosa, R. bifida, Lactaria Hibbardae, Clavaria fusiformis,* and *Pholiota Johnsoniana* are illustrated.

Murrill, W. A. A new mephitic *Claudopus.* Mycologia **7**: 290. S 1915.

Murrill, W. A. Notes on *Agaricus reticeps* Mont. Mycologia **7**: 290–292. S 1915.

Norton, J. B. S. Tomato diseases. Ann. Rep. Maryland Agr. Exp. Sta. *27*: 102–114. 1914.

O'Gara, P. J. A bacterial disease of western wheat-grass. First account of the occurrence of a new type of bacterial disease in America. Science II. **42**: 616, 617. 29 O 1915.

O'Gara, P. J. A new disease of germinating wheat. Science II. **42**: 313, 314. 3 S 1915.

O'Gara, P. J. Occurrence of the bacterial disease of Sudan grass in the Salt Lake Valley, Utah. Science II. **42**: 314, 315. 3 S 1915.

O'Gara, P. J. Occurrence of *Thielavia basicola* as a root parasite of watermelons in the Salt Lake Valley, Utah. Science II. **42**: 314. 3 S 1915.

Osmund, A. V., and Anderson, P. J. Ring-spot of cauliflower. Phytopathology **5**: 260–265. *f. 1–4.* O 1915.

Rolfs, F. M. A bacterial disease of stone fruits. Cornell Agr. Exp. Sta. Mem. 8: 381–436. *f. 59–70.* Jl 1915.

Rosenbaum, J., and Zinnsmeister, C. L. *Alternaria panax,* the cause of a root-rot of ginseng. Jour. Agr. Research **5**: 181, 182. *pl. 12, 13.* 25 O 1915.

Scales, F. M. Some filamentous fungi tested for cellulose destroying power. Bot. Gaz. 60: 149–153. 14 Au 1915.

Shear, C. L. The need of a pure culture supply laboratory for phytopathology in America. Phytopathology **5**: 270–272. O 1915.

Spegazzini, C. Fungi nonnulli senegalenses et canarienses. An. Mus. Nac. Buenos Aires **26**: 117–134. 1915.

Describes fourteen new species.

Spegazzini, C. Laboulbeniali ritrovate nelle collezioni di alcuni musei Italiani. An. Mus. Nac. Buenos Aires **26**: 451–511. *f. 1–49.* 1915.

Thirty-seven new species are described.

Stahel, G. *Marasmius perniciosus* nov. spec. de veroorzaker der krullotenziekte van de cacao in Suriname. Suriname Dept. Landb. Bull. **33**: 1–27. *pl. 1–12.* S 1915.

This article is also published in English and German in the same bulletin.

Stakman, E. C., and Jensen, L. Infection experiments with timothy rust. Jour. Agr. Research **5**: 211–216. 1 N 1915.

Stewart, A. An anatomical study of *Gymnosporangium* galls. Am. Jour. Bot. **2**: 402–417. *pl. 15, 16* + *f. 1.* O 1915.

Stewart, V. B. Some important leaf diseases of nursery stock. Cornell Agr. Exp. Sta. Bull. 358: 169–226. *f. 66–94.* Ap 1915.

Studhalter, R. A., and Ruggles, A. G. Insects as carriers of the chestnut blight fungus. Pennsylvania Dept. Forest. Bull. 12: 7–33. *f. 1–4.* Ap 1915.

Thaxter, R. New Indo-Malayan Laboulbeniales. Proc. Am. Acad. Arts and Sci. **51**: 3–51. Au 1915.

Includes *Tettigomyces* nov. gen. and forty-six new species in other genera.

Thom, C., and Turesson, G. W. *Penicillium avellaneum,* a new ascus-producing species. Mycologia **7**: 284–287. *f. 1–3.* S 1915.

Townsend, C. O. Sugar beet curly-top. Phytopathology **5**: 282. O 1915.

Waldron, R. A. Physiological studies on the chestnut blight disease. Ann. Rep. Penn. Agr. Exp. Sta. **1912–1913**: 152–156. *f. 1–4, I–IV.* 1914.